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BOSTON JOURNAL OF COMMERCE AND TEXTILE INDUSTRIES and SOUTHERN MILLS.

DEVOTED TO THE MANUFACTURE OF TEXTILES.

Vol. 73, No. 1. ATLANTA, GA., NOVEMBER, 1908. 20 Cents a Copy.

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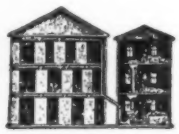

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BOSTON JOURNAL OF COMMERCE AND TEXTILE INDUSTRIES and SOUTHERN MILLS.

Vol. 73 ATLANTA, GEORGIA, NOVEMBER, 1908. No. 1

PUBLISHED MONTHLY BY

Cotton Publishing Company

ATLANTA, GEORGIA, U. S. A.

CHICAGO, BOSTON,
PHILADELPHIA, NEW YORK,
DALLAS, TEX. CLEVELAND O.
TORONTO, CANADA MANCHESTER, ENG.
80 Confederation Life Bldg. 22 St. Mary's Gate

HENRY G. KITTREDGE, Editor.

Address all European correspondence to
THE SECRETARY.

COTTON,

22 St. Mary's Gate, MANCHESTER, ENG.

SUBSCRIPTION RATES

DOMESTIC..... $2.00 PER YEAR
FOREIGN..... $3.50 PER YEAR

COTTON (Manchester) is published weekly, except at Easter, Whitsuntide and Christmas; subscription price, $5.25 per year. Address all American communications to Atlanta

Contributions and practical letters solicited.
All accepted matter will be paid for liberally.

Entered at Atlanta Postoffice as Second-class Matter.

AUG 19 1910

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## A NEW ENGLAND PUBLICATION IN THE SOUTH.

We announced in our last month's issue the combination of *Southern Mills* with COTTON. With this month's issue we have to announce a similar combination of the *Journal of Commerce* of Boston, Mass., with COTTON, thus bringing together the oldest textile paper of continuous publication under its individual name in the United States, with the leading technical textile magazine in the South.

The *Journal of Commerce* was established in 1872 with the idea of making it a commercial publication, in which matters pertaining to textiles should be incidentally discussed. Almost immediately upon its first appearance, however, it gave textiles and the mechanics relating thereto chief prominence, and intensified this feature as it grew in stature, till it become not only the leading paper without a peer in this country devoted to the technique of textile manufacture, but the greatest publication of its kind in the world. In course of time it found imitators and competitors, but the momentum and vitality it had acquired carried it along in a career that attracted to it the patronage of many of our best textile machinery manufacturers, who have utilized it for the exploitation of their products for well on to half a century. Its readers number hundreds of the oldest, most successful and conservative of American mill owners and operators who have been its continous subscribers almost since its foundation.

The problem confronting the publishers as to the frequency of issue of the combined publications has been decided in favor of the monthly edition. This decision has resulted largely upon the advice of more than a hundred representative American textile manufacturers who almost without exception favor the monthly as against a weekly. In this modern day the office of the mill needs and must have daily advice relating to markets, and this only the daily paper can give.

The phenomenal increase in the circulation of American monthly magazines, reaching in the aggregate to many thousands, shows that Americans of very class are tending more and more toward the patronage of monthly magazines for that heavier reading, and in particular along technical lines, which the monthly is accepted as furnishing. Neither the weekly nor the daily can hope to compete with the monthly in the delineation of intricate technical methods requiring much space for description and illustration to the extent their importance warrants.

All subscribers to the *Journal of Commerce*, since its subscription price has been three dollars per year, will have their subscriptions to the combined publication extended for a term equal to one and one-half times the period paid for and remaining unfilled on this date. To this widely extended list of readers the editor and publishers hope to give all that was best in the three separate publications and more, and invite the criticisms and suggestion of readers and advertisers alike.

## ANNOUNCEMENT.

TO OUR FRIENDS AND PATRONS:

We wish to announce to you that with this issue of COTTON our paper has been consolidated with that paper. Henceforth it will be published with COTTON, a move which will certainly be of great value to our patrons.

The *Journal of Commerce* was started in 1872, and is the oldest weekly textile paper in the United States. During all of that time, W. I. Holmes has been connected with it as treasurer, and it is not without some regret that he has sold the property. The sale was due to his advanced years, and the fact that the time had come when he desired to be relieved of business cares. There never was a time in the paper's history when it was in a better position to serve its patrons, and the service which will be given by COTTON will be of even greater value as it will not only include ours, but will also take in the present valuable circulation of COTTON.

We believe that the advertisers who have been with us will find it of great value to continue with COTTON, feeling assured that the combined circulation of these two papers will be much larger than can be obtained in any other textile paper.

Thanking you for all favors which we have received at your hands and hoping that you will continue with our successors, we remain, Yours very truly,

W. I. HOLMES, Treasurer,
Boston Journal of Commerce Publishing Co., Boston, Mass.

## DYEING.

We devote considerable space in this issue to the dyeing, bleaching and finishing of textiles, from writers that may be accepted as authorities on the subjects that they have selected.

These subjects have been familiar in their practical application for centuries, even into prehistoric time, yet their scientific relation to practical art is not yet fully understood, and is, in some respects, as occult as ever before. New dyes are produced, new discoveries made, new sources of color production revealed, and improved methods of mechanical manipulation invented, as time goes on, without greatly encroaching upon the apparently immense possibilities that are waiting for exploitation and development. The theory of dyeing, for instance, is not much more understood to-day than it was a half a century ago, and in some particulars no more than a century ago. This still leaves the art of dyeing in a state of bewilderment, for an art is imperfect unless the theory of its existence is known. While a theoretical dyer may be a poor practical dyer, the latter would be an exceedingly unreliable one should he endeavor to pursue his vocation without a correct comprehension of the theories which govern its exercise. Not only should the dyer know the nature of the dyes that he uses, but he should be familiar with their action upon the fibers that he treats, and moreover he should know the chemical and physical structure of these fibers and their action under the conditions to which they may be subjected.

While it is advisable for the dyer to know the theory and practice of his trade, he can know these only so far as they have been disclosed by the researches and experiences of his own or those of others. In this respect, it must be admitted that there is much that is wanting, without any probability of the deficiency being immediately made good. Notwithstanding the insufficiency of knowledge affecting the dyeing of textiles, there is at the disposal of dyers, and of bleachers, as well, a large amount of valuable literature that record the best thoughts of those who have carried into successful practice the theories and ideas of their own and others. But it is a well observed fact that a person to be a successful dyer, must not only love his trade, but be intelligent enough to grasp the significance of its intricacies. More than this,—and in this respect he stands in a class by himself or in close relation to the designer,—he must, of all things, have a gifted eye for colors, as to their shades, tones and hues in all of their various modes.

The theory of dyeing is not much, if any, nearer solution than it was a hundred or more years ago. Scientists are, seemingly, as much at variance concerning it as they were in the days of Le Pileur d'Apligny and Hellot, in the 18th century, who are credited with being the authors of the mechanical theory affecting fibers in their affinity for dyes, and whose position is supported by many at the present time. There are those who believe as strenuously in the chemical theory, while there are others who support, with great clearness of reasoning, the chemico-mechanical theory. The latter theory so thoroughly carries conviction to the student that its adoption in one's belief seems inevitable. It should not be considered a compromise theory between the views of scientists occupying the two extremes of thought, but one that is independent in the principles upon which it is established. We believe modern research is becoming more favorably inclined to an acceptance of this theory than to anything else.

A catalytic theory of dyeing has been advanced as possessing attractive features of a chemical nature, and we rather expect to see it taken up in future researches with prospects of its adoption in explanation of some of the actions manifested between the fiber and the dye.

Whatever may be said in any controversy about the theories of dyeing, the subject is more of a complex one than may at first appear. The dyer of cotton, for example, already knows that he must vary the proportions of his dyes or their manipulation with each season's growth of cotton, which changes in its chemical constituents due to the plant-food it may absorb and to climatic conditions affecting development and ripeness. He, certainly, would not attempt to apply the same dyeing recipe to mercerized cotton as he would to ordinary cotton, and expect the same shade of color. The reason why he should not, is something that might advantageously employ his thoughts, which would undoubtedly, be greatly stimulated were he to submit the physical characteristics of the two forms of cotton to a microscopical examination. He would, in all probability, come to a conclusion that there is a chemical as well as a physical reason for requiring different recipes for mercerized and unmercerized, or ordinary, cotton, which would be well within the fact. In any event, the cotton dyer has more of a problem in the production of color on the fiber, than has the wool dyer. The latter deals with a fiber that more readily responds to his efforts.

## WHAT IS PLAIN CLOTH?

Oftentimes the hardest thing to do is apparently the simplest act, and oftentimes the simplest word is the most difficult one to define. This dilemma, in the last instance, manifested itself in the councils of the National Association of Cotton Manufacturers at its last semi-annual meeting in the effort to define the term "plain cloth" as applied

to a cotton manufacture. This matter was submitted prior to this meeting, to a committee of eleven practical cotton manufacturers for its consideration, the fruit of which appeared in a somewhat elaborate report to the association at this meeting, yet without anything of a concrete nature that could be denominated as clarifying the situation. It afforded, however, a subject for thought on the part of the members and others who might be interested in it as a commercial question.

As stated by a member of the committee who had the subject matter specifically in hand, "off-hand, nothing would seem much easier than to define a plain cloth, and a plain weave seems equally simple, but as one thinks it over certain difficulties arise which are not easily disposed of." This was evident in the fact that the committee of eleven devoted three sessions to the question, one of which to its exclusive deliberation for seven hours, without, however, arriving at any conclusion to "justify more than a preliminary or tentative report," and more time was asked for completing the work. More than this, a large number of manufacturers were communicated with as to their conception of the meaning of this term—plain cloth—without eliciting from any one person, the desired definition that would stand exact discrimination as fitting the requirements of trade.

Every manufacturer to whom the question was submitted, and others, know full well what plain cloth is and how it is made, and would not hesitate or miss in selecting the proper goods were they placed promiscuously with others of different character; but when it comes to defining the goods in words that will stand the exacting requirements of the trade for something that will be accepted as standard, showing the structure of the fabric, it becomes an entirely different matter—a problem of no easy solution.

The commercial importance of the subject is recognized in the statement of the committee that "accompanying the growth in manufacturing and distribution, there has been no corresponding advance toward the standardization of cotton manufactured products, nor any real growth toward uniformity of practice, or terms under which such products shall pass from manufacturer to consumer, or from seller to buyer." The committee's work in hand seemed specifically applicable to the construction of staple gray cloth which is the principal production of American mills, North and South, especially those in the latter section, all of which is plain cloth within the present scope of inquiry. While the committee did not consider the terms "plain cloth" and "staple gray goods" synonymous they were accepted as interchangeable in trade parlance, and were so regarded in its report.

After receiving and methodizing the various definitions from nearly thirty manufacturers the committee, through its sub-committee of one, offered to the association the following:

"A *plain weave* uses two harnesses, each harness carrying one-half of the warp threads drawn in uniformly and alternately, and each thread of the warp alternately goes over and under each thread of the filling. Any number, any kind of yarn may be used either in warp or filling."

"*Plain cloth* is cloth made in a plain weave of gray yarn (i. e. not colored), in which all of the warp threads, except the selvage, are made of one number of yarn, drawn uniformly one or two ends in one dent through reed, and with practically uniform tension, and in which the filling threads are one number of yarn. The numbers of the warp and filling need not be the same, but when different numbers are used, the difference must not be so great as to produce a noticeable effect in the cloth, and both the warp and filling threads must have approximately standard twists."

To the manufacturer these definitions of "plain weave" and "plain cloth" are clear. He knows, at least, their significance, and he needs nothing further for their elucidation. But their import is impaired when they appeal to the understanding of the merchant or consumer who may not be familiar with the technicalities of manufacture. In fact, they do not conform to the purpose of the committee who is responsible for their declaration, which is to "better define for commercial use the incomplete specifications heretofore generally used, and which shall be accepted as a standard by commission houses, converters, and by all buyers and consumers." Moreover, the committee declares that the definitions should be "thoroughly practical" and should come within the "possibilities of the largest number of consumers." The objection to the above definitions is that they are too practical or too technical to be comprehended by consumers, who have little or no conception of the functions of harnesses, or their specific operation in twos or multiples of twos, or of reeds or of dents. The word "number" is fully understood by the manufacturer, and is more familiar to his vocabulary than the word "size," but to the merchant or consumer it conveys an indistinct meaning as compared with the latter word.

As we understand the purport of the committee's report, it is to fix upon definitions that will come within the comprehension of the customers of manufacturers, be they converters, commission merchants, jobbers or consumers. Such being the case, no vague terms, familiar only to those versed in the technique of manufacture, should be employed if others of common knowledge can be substituted with equal significance. It is for this reason that the foregoing suggested definitions are, in our opinion, open to criticism, in that they partake too much of mill parlance or dictum.

In order to meet objections or criticisms of this kind we have ventured to propose a definition of our own, as below, which we think is concise and explicit, and easily comprehended by those to whom it appeals, from the practical manufacturer to the consumer.

*Plain cloth, as applied to cotton goods, is that made by the alternate interlacing of single warp and weft yarn of approximately standard twist, in contiguity, at uniform tension, bleached or unbleached, without ornamentation by reason of color or noticeable irregularity in the size of yarn employed.*

We admit that this is not our first draft of a definition, and whether the one here given is subject to modification or extension is a matter we shall have to leave to further developments. It, at least, eliminates expressions that smack of mill talk, and is couched in language that is of common knowledge. The word "contiguity" we have introduced so as to exclude such fabrics as cheese cloth, with open mesh, which otherwise might be included. The use of the word "single" is to exclude two or more ply yarn, and we have used "weft" instead of "filling" because it means the same thing and is more generally or popularly understood. The term "uniform tension" we have retained as excluding seersuckers or puckered goods as intended by the definition given by the committee. "Bleached and unbleached" we have substituted for simply gray, not colored, yarn, because we do

not believe it was the intention of the committee to exclude goods that are bleached or made of bleached yarn. To the members of the association, the meaning of "cloth made of gray yarn" is clearly understood as being woven of yarn made from cotton in its natural state, but to the popular mind and to the ordinary merchant the word "gray" in this connection is not as intelligible as it should be. Moreover, the definition, in our mind, should apply to the goods as they are put on the market and not simply to the condition as they leave the loom. We have used the word "size" instead of "number," because more within popular comprehension, and equally as expressive of what is intended. While we have employed "noticeable irregularity" in regard to the size or number of yarn used, thus conforming to the purport of the definition furnished by the committee, we do so with some misgiving, for there are mills in New Bedford, for example, that make cloth of 70's warp and 120's filling which is denominated "plain cloth," while a fabric of 70's warp and 30's filling is called a repp or poplin.

## PRESERVING THE IDENTITY OF A COTTON BALE.

One of the resolutions passed by the National Association of Cotton Manufacturers at its last meeting was the endorsement of a method of identifying cotton bales consisting of placing a strip of cloth having repeated plain markings under the hoops of the bale or any other method that will provide equal security against elimination or effacement of properly lettering shipping directions.

Something, no doubt, should be devised by which cotton bales can be identified, and traced from the time they originally appear in the market till they arrive at their destination in the hands of the consumer. This, however, is no new question as it has been agitated for a generation or more, and while its necessity has always been recognized nothing has been accomplished that has met with general acceptance. A method of some kind within the purport of the above resolution becomes a matter of particular importance when considered in connection with the material now used for baling cotton, the coarse fabrication of which operates against the receiving and retention of distinguishing marks. Were the material the same as that used for baling Egyptian or Sea Island cotton, any recommendation of this kind would not be thought necessary. Taking the fabric as we find it, used for covering American cotton, some scheme should be devised that will enable a buyer or spinner to, at least, know his purchase by its marks.

Whether the strip of cloth alluded to is the best, can be determined only by a season of trials under ordinary conditions of baling and compression, and of transportation. A few tentative trials are of no determining value. This may be said of any scheme that may be proposed or tried. But whatever is adopted, it must be simple in its conception and application, as well as durable in retaining its distinguishing characteristics under all circumstances to which the bale may be subjected. The strip of cloth with markings is the invention of J. F. McGowan, of Augusta, Ga., member of the late firm of Inman & Co., of that place. It has not been used to any great extent, or enough upon which to base an opinion of its real practicability. It seems feasible, and that is all that can be said about it.

Our own opinion is,—and it is only an opinion, for the plan has never been demonstrated any more than the strip of cloth,—that a better scheme than the foregoing is the fixing upon one or more of the bands about the bale, of a metallic label or tag bearing an embossed number or mark that can readily be read or deciphered. A label of this kind can be placed on the bale at the ginnery, and another, if thought expedient, at the compress, the only two places where any distinguishing mark of this description can be applied, be it a slip of cloth, a metallic tag, or anything else. Such a metallic tag has been invented, and advertised for several years past, and we believe in its practicability at any stage of baling as well as serving all requirements for keeping track of the bale upon which it is placed from start to finish. The expeditiousness of its application to the band at the press must depend on the dexterity of the operator, the same as pertains to every manipulation. Among the advantages of metallic tags are that it is impervious to fire and water, will stand rough usage, and is immovable if properly put on. We know of nothing better for perpetuating the identity of the bale from the ginner or planter to the spinner.

## COTTON MANUFACTURING IN CHINA.

Spinning and Weaving Mill at Wuchang.

The Chinese Government some years ago established four industries in Wuchang. The industries comprised a silk filature factory, a ramie factory, a spinning mill, and a cotton-cloth mill. The officials conducted these ventures for nearly ten years, but owing to the financial losses experienced in their operation the industries were leased to Chinese merchants at $120,000 per year. Some five years ago Mr. Teng, the compradore of the Hongkong and Shanghai Bank at Hankow, negotiated for a five-year lease, which recently expired, and his profits for the lease period amounted to nearly $480,000. A Mr. Wei, a wealthy tea merchant, has now taken over the lease.

All the machinery in the cotton-spinning mill was manufactured in 1895 by a British concern. Nos. 14 and 16 cotton yarns are produced. The No. 14 is made on frames of 140 spindles each, and the No. 16 on frames of 160 spindles each. The factory turns out 5,000 pounds of yarn per day, which amounts to about 40 bales. The No. 14 yarn has 14 skeins in one packet and 40 packets to one bale, and the No. 16 yarn has 16 skeins in one packet and 40 packets to the bale. The power for the whole factory is supplied by a 1,500-horse-power engine having four boilers, which in operation consume about 30 tons of coal per day. About 900 persons are engaged in the mill, the majority being boys of 12 to 15 years of age, the latter being chiefly employed in the spinning work, being more adept at handling the yarn than the men.

The weaving plant of the cotton-cloth factory is one-third larger than that of the yarn mill. The factory has 692 weaving machines, 500 of which are at present in operation. The output per day is about 20 bales of a cloth something thicker than foreign calicoes. Each bale consists of 15 pieces, and each piece is 40 yards in length. All of the machinery in this plant was manufactured in England in 1891. About 1,200 persons are employed in the mill, the boys attending to the spinning and the men to the weaving, etc. The power for the whole plant is supplied by an engine of 2,200 horse-power, having six boilers.

—U. S. Consular Report.

# The Utica Willowvale Bleaching Co.,
## Chadwicks, N. Y.

The Utica Willowvale Bleaching Co., has a capital stock of $375,000. Its officers are: D. N. Crouse, president; C. A. Miller, vice-president; C. B. Rogers, secretary and treasurer; John McManus, superintendent and buyer, and Fred C. Freund, with offices at 320 Broadway, representative.

This company is located on the D. L. & W. R. R., on which New York deliveries are made in thirty-six hours, and a through car to the West each day, with a delivery in Chicago of three days' time.

The Sauquoit Creek passes in front of the bleachery giving ample water supply. In addition to this, there are three large reservoirs with a total capacity of 10,000,000 gallons of water. These are fed from natural springs and yield the finest kind of water for bleaching. Being located at some distance from Utica and out of fire protection, a pond, with a capacity of 2,500,000 gallons of water and 125 feet above the ground floor of the bleachery, gives a 50-pound pressure and supplies the hydrants and sprinkler system throughout the plant. The company has organized a fire brigade consisting of forty employees, who are drilled weekly, and in addition to the protection of the plant the brigade is also a protection to the village. The company owns twenty-five tenements consisting of cottages and double cottages. The tenants are encouraged in making their grounds attractive. The total number of hands employed is 400.

The power plant consists of seven horizontal tubular boilers of 120 H. P. each and three horizontal tubular boilers of 175 H. P. each. Improvements are being made in the steam end of the plant, and when they are completed there will be a battery of ten boilers of 175 H. P. each. There has recently been erected a radial brick chimney, 125 feet high, having a 7-foot flue opening.

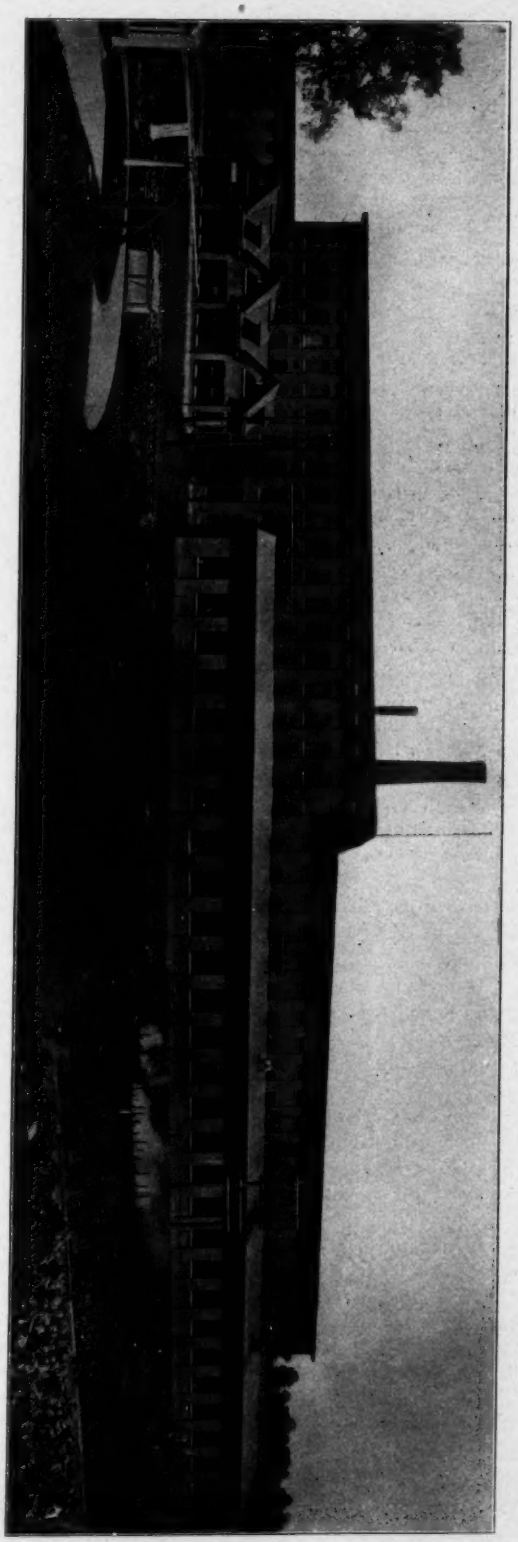
A complete system is being installed to utilize every particle of exhaust steam so that there will be practically no waste, and it is calculated that a saving will be effected of about 15 per cent. of the amount of coal consumed. The main engine is a Corliss of 350 H. P. In addition to this, there are thoroughout the plant motors totaling 300 H. P., which drive separate departments.

From the main line on the D. L. & W. there are separate switches running to the various departments. One branch, which goes to the gray room, carries all incoming freight; another goes to the warehouses from which all goods are shipped; another to the supply warehouse which receives all of the various bleaching and finishing materials. Each one of these is independent of the other.

The gray room is 225 feet by 50 feet. In addition to the space necessary for the laying out of goods for the bleaching process, there is a storage capacity of about 1,000 bales of goods.

The room is equipped with six Rayer & Lincoln sewing machines made by the Dinsmore Manufacturing Co., Salem, Mass., with trimming and marking attachments, also two circular power sewing machines with trimming and marking attachments. Each bale of goods as it is opened for the process of bleaching, is checked to protect customers against errors in yardage made by the works.

From this department the goods pass to the kier room,



BLEACHERY OF THE UTICA WILLOWVALE BLEACHING COMPANY, CHADWICKS, N. Y.

which has ten seven-ton open kiers, and five four-ton pressure kiers. Four of the seven-ton kiers and the four-ton kiers are equipped with the Jefferson circulating device. This, the company figures, gives a great saving in steam, and a more even, and cleaner boil than any of the old methods.

For goods which require singeing, such as lawns, cambrics, etc., the company has a Curtis & Marble five-burner gas singeing machine, taking in goods up to 54 inches in width, having a capacity of 100,000 yards per day. The gas is manufactured from gasoline.

The bleach house proper is 164 feet by 60 feet and is equipped with the latest washing, chemical and souring machines, having a daily output of 300,000 yards.

The next operation is in the starching room, which is 150 feet by 60 feet, and equipped with water and starch mangles.

The tenter room contains four 90-foot tenters, and has a separate starching department with four starch mangles. This room is driven entirely by electricity.

From the starching department the goods pass to the can-drying room—a recent addition to the plant. This room is 140 feet by 40 feet and is equipped with six sets of drying cans, each having a capacity of two strings of cloth up to 40 inches, or a total capacity of about 275,000 yards per day. In addition to this drying room is an air-dry shed, which is on the third floor of the main building. This is entirely for wide sheeting, that is, from 54 inches to 108 inches wide. This is one of the oldest methods of drying wide sheetings, and the company holds that the results obtained warrant it, the full properties of the starch not being baked as on a steam cylinder.

From the can-drying room the goods pass to the calender room, 40 feet by 140 feet, which is on the same floor as the drying cans. This room is equipped with four six-bowl calenders, five three-bowl, and three two-bowl. This department is operated, as well as the can-drying room, entirely by electricity. Each set of cans is operated and controlled by its own motor. The calenders are all equipped with expanders, which are very highly thought of, as they practically do away with the belt-stretching process, and enable the finishing of all goods to the desired width.

The finishing and packing rooms, 60 feet by 275 feet, are on the second floor of the main building, the goods being conveyed from the calender room by a belt elevator which runs continually, and requires no extra labor, as the roll is simply put on a bench at the foot of it, and is landed on a bench in the finishing room above. This finishing room is equipped with fifteen yarding machines. After the goods are folded they are sent to the presses, of which there are five hydraulic ones with 12-inch rams. The packing room is equipped with a trolley track system which runs directly to and into the warehouses, of which there are three, each with a capacity of 5,000 cases of finished goods.

The company operates a sheet and pillow-case department which occupies two floors of the extension of the main building, each floor being 165 feet by 60 feet, and employs 150 hands alone. The sewing department contains 170 Singer sewing machines, and 80 others of different makes, with a daily output of 2,500 dozen pillow-cases and 1,500 dozen sheets. The lower floor is used entirely for the folding, mangling, tying up and packing of the manufactured sheets and pillow-cases. This department is run entirely by electricity. There is located in this department, a circulating library which is free to the employees of the entire plant.

The carpenter shop, in which all patterns for castings or repair parts are made, and the machine shop, in which all castings are milled, are also features of the plant. No repair work of any description is sent from the premises, with the exception of the rough castings.

Outside of the wide sheetings, up to 108 inches in width, for which the plant was originally equipped, the principal finishes are given to cambric and muslin for the underwear trade. Such goods have necessarily to be soft and pliable and yet retain a great deal of body. Much experimenting and equipping of machinery and attachments have been done to produce the desired results, and the company now feels that it furnishes one of the best finishes of this kind in the market. It contains no mineral, being entirely a pure starch finish, and is guaranteed not to hurt the needle or injure the knife in any way. This finish is also used on the sheets and pillow-cases into which a large part of the company's product is manufactured. The company has a total output of about 100,000 yards per day of the cambric finish and the same of muslin. On wide sheetings it has a daily output of about 150,000 yards. The plant is equipped for fine work, as lawns, dimity, India linon, checks, and goods of like character.

While the plant is situated in the central part of New York State, it is on the through lines to the West, and is, therefore, admirably located for the handling of southern goods going to these points.

The company has recently installed a cell drier made by the Cell Drier Machine Co., Taunton, Mass., which takes goods up to 54 inches wide. Using this machine the water mangling of the goods is omitted, the goods being dried from white bins directly to it. It has a capacity of about 60,000 yards per day, and is giving excellent satisfaction.

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## CHILD LABOR IN NORTH CAROLINA.

Reports received from the cotton, woolen, knitting and other textile mills of North Carolina with regard to the changes made by and the effect of the enforcement of the new law designed to regulate the employment of children in cotton mills and other factories of North and South Carolina, which went into effect this year, are stated to be highly satisfactory.

Eighty per cent. of the managements of these mills are said to express their satisfaction with the change and many declare their approval and determination to aid in its enforcement.

In nearly every reported violation it was a case of parents who had attempted to enter children in mills when the children were not old enough or had failed to comply with the compulsory education law.

The North Carolina law was framed from suggestions made by Capt. F. Dilling, president of the Cora Cotton Mills, King's Mountain, of that State.

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It will be found that doctoring up the roving by the carder in order to get it along, will not improve its condition for its spinning.

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Inquiries about anything pertaining to the textile business will be cheerfully answered by COTTON.

# Child Labor Law in Mississippi.

The act passed by the Mississippi legislature, March 21, 1908, and which went into effect October 1, 1908, to regulate the employment of children in mills, factories and manufacturing establishments in that State, provides that no children under the age of twelve years shall be employed in or be permitted to work in any mill, factory or manufacturing establishment in the State. That no child under the age of sixteen years shall be employed or detained in any such establishment within the State for more than ten hours in any one day, or for more than fifty-eight hours in any one week, or be employed in or detained in any such establishment between the hours of 7 p. m. and 6 a. m. That is shall be unlawful for any person, firm or corporation to employ or detain or permit to work in any such establishment in the State, any child under the age of sixteen years without first requiring the child to present the affidavit of the parent or guardian or person standing in parental relation to such child, stating the place and date of birth of such child, and also stating the last school attendance of such child and grade of studies pursued, and the name of school and name of teacher in charge. The employer shall preserve such affidavit and keep a complete register of such affidavits showing all the facts contained therein.

## Manufacturers Meet The Situation.

On September 23 the Mississippi Textile Manufacturers' Association, of which T. L. Wainwright is president and J. H. Ledyard is secretary, met in Jackson, Miss., and after careful deliberation of the provisions of the act made the following recommendations for the textile manufacturers of the State to follow.

MILLS TO OPERATE ON OLD TIME.

That all the mills continue, when operating six days, to work on the basis of full 63 hours per week, as at present, and work at least eight hours of same on Saturday.

SCHEMES FOR MEETING REQUIREMENT OF THE ACT.

To make the spinning department (which is the only one employing any number of children under 16 years) operate on the above schedule the following plans are suggested:

Supposing a mill has 36 frames, or 72 sides, and each spinner runs 6 sides at a total of 12 spinners. Employ two extra spinners who come in at the regular starting time, say 6 a. m., and have two regular spinners come in at 7 o'clock, or one hour after starting-up time. When these two regular spinners come in at 7 a. m., the two other regular spinners are sent home for one hour, and the two extra spinners take their places, and so on until the regular spinners have had one hour's relief during the day.

Another suggestion: The doffer boys are actually employed only about eight hours out of the regular eleven hours' running time. The intent of the law is to prevent children under 16 working continuously long hours per day. You make a contract with the parent of the child for 10 hours' work per day. Have the overseer keep an actual record of the time the doffer is actually at work and allow the doffer such time as not at work to be his own time. In this way the 10 hours would be part of 11 working hours. Should it be preferred the doffer could be required to give one hour continuous work the last hour of the day to take the place of the spinners who can only work 10 hours per day. The doffer's time would then be nine hours at intervals of doffing. The important thing is that the total time employed shall not exceed 10 hours, and that the contract state specifically that all the intermissions between doffing belongs to the parent of the child and not to the mill.

## Views of President T. L. Wainwright.

At our request, President Wainwright has furnished his views of the act, and incidentally those of the association, as follows:

*Editor Cotton*: It is the unanimous opinion of all the mills of this State, and all mill operatives that I have talked with, or had expression from, that the recent child labor law passed by the Mississippi legislature was most radical and unjust alike to the mills and to the employees.

I have before me copies of the child labor laws in all the States of the South, and will say we have the most stringent one of any of them. The age limit is fixed by all the other States not over 14 years, while ours is 16 years. The North Carolina law allows the mills to run 66 hours per week, and all the other States not less than 60, and allow them to regulate their own hours per day, while in the case of the Mississippi law we are not only restricted to 58 hours, with an age limit of 16 years, but we are also restricted to not over 10 hours in any one day.

EMPLOYEES MUST LOSE THEIR SATURDAY HALF-HOLIDAY.

So you see with the shortest hours per week, we can not give the employees half-holiday on Saturday, which they so greatly desire, and which is given by a majority of the mills in other States where they work from 60 to 66 hours per week.

HOW DOFFER BOYS ARE AFFECTED.

A majority of the children under 16 years in the mills of Mississippi are what is known as doffer boys, who really work in the mills only from six to eight hours per day, never over nine hours. The balance of the time they are out of the mills and out of the mill yards playing ball and other games in the open air and sunshine, when the weather permits. You probably understand these boys doff their spinning frames and get through in about one to one and a half hours, never over two hours. Then it is anywhere from two and one-half to four and one-half hours before these frames fill up the bobbins and are doffed again, so that during the time the frames are filling up the boys are permitted to leave the mill, which we really prefer as it gets them out of the way. They go out on to the lawns, or anywhere so that they are in whistle call when they are again needed. Still this stringent child labor law affects these very boys.

FAMILIES ARE NO LONGER SELF-SUSTAINING.

Now again, with a 16-year age limit the mills will have a number of families with perhaps anywhere from three to five hands working in the mills, making a good living, and in many cases all but one or two are under the age

limit. The advocates of this child labor law say, why can not we get older help? The answer is that we can not get enough help of any age suitable to work in the mills. This, every mill in the country knows.

If we leave out these hands under 16 years old the family is no longer self-sustaining and will have to move away from the mills. In this way we lose one or two hands in each family that are over 16 years old, still cutting our hands of age down and doing more harm in this way to the people and the mills.

It is a fact that can be proven, and is admitted by the chairman of the committee who had this bill in charge, that there was an agreement by the committee that they would fix the hours per week, letting the different mills regulate the hours per day so as to stop on Saturday at any time they pleased, at noon or a little after noon, and even before noon, if any one cared to do this. But this bill was acted on during great confusion, at the very end of the session and was railroaded through in its objectionable, damaging, drastic form.

MILLS WILL OBEY THE LAW.

The mills, however, have agreed to swallow their medicine and to obey the law with the least possible damage to the mills and the employees, and they are all acting on that plan now, but we feel sure it can be made so clear to the next legislature that they have passed a most unjust and damaging law to the mills and the people working in the mills, whom they sought to benefit, but have really damaged, that the next session of the legislature will surely pass a suitable remedial amendment.

## Views of the Author of the Law.

James R. McDowell, of the law firm of Longino & McDowell, Jackson, Miss., the author of the law, writes us as follows:

*Editor Cotton*: I have been favored by T. L. Wainwright with a copy of a letter which he wrote you, and in order to present to you more fully the status of the child labor statutes of Mississippi, I take the liberty of addressing you. I feel that, in justice to myself as author of the law, you should be put in possession of our side of the question.

I trust that you have a copy of the statute before you and if so, I invite your careful attention to the law so that you may see whether my statement, or that of Mr. Wainwright is borne out by the facts. Mr. Wainwright states that the age limit is sixteen. As a matter of fact it is twelve, though frankly, I should much prefer it to be fourteen. Between the ages of twelve and sixteen years, it is necessary for children applying for work in mills to present a certificate from their parents which the employer must keep on record, and I think it is a wise provision to have knowledge of certain facts concerning the age, educational advantage and health of the child under sixteen before it is allowed to work in a factory.

THE LAW IS TOO LENIENT.

In my judgment, the law is far too lenient both as to age limit and many other restrictions, in spite of the fact that Mr. Wainwright contends that it is the most stringent of all the States, many of which I have read. After a child reaches the age of sixteen, there is absolutely no restriction, the mills can take him and do what they please with him, and the State has nothing to say, but between sixteen and twelve the State attempts certain regulations, and below the age of twelve, there is a prohibition placed upon factory work.

THE MAIN KICK IS AGAINST THE FIFTY-EIGHT-HOUR LIMIT AND TEN HOURS PER DAY.

Now, the main kick seems to be because there is a time limit of fifty-eight hours per week, and not more than ten hours per day for children between the ages of twelve and sixteen. It seems to me that with grown laboring men contending for and getting eight-hour days, cartainly little children should not be compelled or allowed to work in factories more than ten hours out of twenty-four. Even with the ten-hour day they must in certain seasons of the year, arise before sun-up and do not leave work until after sundown. Certainly the working day should be no longer, no matter what North Carolina and other States permit. Delaware has a whipping post, but certainly we would not advocate maintaining one, although one of the principal opponents of the child-labor law introduced a bill in the last legislature for such a mode of punishment.

THE HALF HOLIDAY ON SATURDAY.

Mr. Wainwright is very solicitous about giving the children half holiday on Saturday. The law does not prevent his doing so; he can work them ten hours the first five days in the week and five, six or any other number not exceeding eight on the last day of the week. If he wants to stop at one o'clock he can do so, but we do object to working them twelve hours five days in the week and six hours Saturday, or eleven and a half hours five days in the week and half of the day on Saturday, as I believe the general practice was in this State to maintain a sixty-three hour week, which, of course, does not include the lunch hour.

HOW TO GET ALONG WITHOUT CHILDREN.

He complains that he can not get along without children under sixteen years old because the family would move somewhere else if he did not employ them. He can employ them if he will not work them more than ten hours a day and they will furnish the proper certificates, which is very easy to do. It was argued that the children would have to work the same number of hours as the grown people, so that the spindles can feed the looms. This could be avoided either by putting in more spindles so that ten hours of their work would equal twelve hours for the looms, or else let some of the looms, which are run by children over sixteen, work more than ten hours. The mills had more than six months in which to get ready for this change, which, after all, is a slight one, and we are gratified to know that they have concluded to abide by the law.

CHILDREN ARE NOT GIVEN SPARE TIME FOR SPORT.

Mr. Wainwright announces to the public that the children under sixteen in the mills of Mississippi have so little work to do that they indulge in baseball and other outdoor sports a large part of the time during working hours, and are called in by a whistle when they are needed. This may be true in the Stonewall Mills, but I dare say cotton mills have never impressed you with the fact that they conduct their business on any such humane and benevolent style; they are in business for money, just like all other factories, and from what I know of them, the children who work at the spindles stand there the entire day for the simple reason that the bobbins do not all run out

at the same time, and they are constantly needed to replace them and mend broken threads and do other work which demands their close attention. I suggest that you go to Gainesville, Augusta, Columbus, or any other big mills in your State and observe how many ball games are being played during working hours in your State. It has always struck me as strange that men who have the interests of the children so deeply at heart should object to a law which prevents them from working children more than ten hours a day.

NO AGREEMENT TO DO AWAY WITH A TEN-HOUR DAY.

Mr. Wainwright makes another statement which calls for a vigorous denial by me. He states that it can be proven, and is admitted by the chairman of the committee who had this bill in charge, that there was an agreement by the committee that they would report the bill for sixty hours and a fourteen-year age limit and would make no recommendation as to the number of hours per day. As a matter of fact, after the bill had passed the senate, in substantially the form it now is, and after a committee from the house, of manufacturers, had met with the senate committee to hear a discussion by the advocates of a child-labor law and the mill interests, which joint meeting was attended by the speaker of the house, the bill was referred to the committee on labor in the house, not a member of which had been present at the joint discussions, and of which committee, several of the bitterest opponents of the child-labor law were members. However, I went before that committee alone and there were present a large number of mill men of the State. After I had made my argument for the bill as it passed the senate, the mill men stated themselves that they were entirely satisfied with every feature of the bill except the restrictions placed on the number of hours per day. They desired a sixty-hour week and to regulate their own hours each day, though I had previously been informed by one of the opponents of the bill that the mills objected to an age limit but not to a limit on the number of hours of employment. My recollection is that such an amendment was proposed in the committee, though not while I was present, of course, and was reported back to the house of representatives, and the chairman of that committtee took the floor to beat this amendment, and through his efforts on the floor the bill passed the house as it had passed the senate, to-wit, with a ten-hour-day limit. I remember also that on the very day after the house committee considered the bill, the daily papers announced that the mill men had agreed to close all day Saturday, and thus deprive the children of a day's pay, though forcing them to work about twelve hours a day the first five days of the week. The mill men admitted before the committee that the children were paid by the day. Now, we had always hoped to have a fourteen-year age limit, but while the bill was in the senate, we agreed on a twelve-year age limit as a compromise. I was not chairman of the committee, but so far as I know there was never an agreement by the advocates of the child-labor bill to permit an amendment to the law which would do away with the ten-hour day. Certainly I did not consent to it.

THERE WAS NO RAILROADING LEGISLATION.

I resent the charge that the bill was "railroaded" through the legislature. It was one of the first bills introduced and it was next to the last bill passed by the house, and I have never seen a bill more bitterly attacked or harder fought or against which a more persistent lobby was maintained. It was committed and re-committed, amended and chopped up, and fought in the senate for weeks, and when at last it passed to the house, it was pigeonholed, and it was only by my continued and persistent trips to the house of representatives that it was ever reported from a committee; and then, after being placed on the calendar, it was again pigeonholed and I myself had to go four times to get it out of the pigeonhole and put it back among the bills for passage. Two efforts were made to side-track it on the last day when it was reached on the call, one by a postponement, and when I appeared in the house and had that effort defeated, a motion was made to adjourn the house, showing that the opponents of the child-labor bill preferred doing no business at all for the rest of the session, rather than take up the child-labor bill, which was next on the call. This was also defeated. All sorts of delays were attempted, and when at last I forced a "showdown," and the bill was passed, it had to be carried back to the senate, and then to the governor, and his signature was only secured about two hours before permanent adjournment. There was great confusion about the time this bill was passed in the house, but it was caused by the persistent efforts of the opponents of the child-labor bill to prevent its consideration by the house of representatives, since they seemed to know that the house would pass the bill if it ever came to a vote.

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## TO MEET THE NEEDS OF AMERICAN MANUFACTURERS ABROAD.

The new two-cent rate of postage put into effect October first between this country and Great Britain, has already had the effect of increasing the volume of such foreign mail by 100 per cent., according to a statement issued by Postmaster Morgan of New York.

To fill a need of American manufacturers for better facilities abroad a "Bureau of American Manufacturers in Europe" has recently been organized, and is open to all reputable American firms. This bureau has leased a large six-story building in the business heart of London, England, and foreign buyers visiting that city will be invited to attend the exhibition of American goods which will be carried permanently. A monthly bulletin will be sent to buyers in every quarter of the globe, personal letters will be despatched to them at frequent intervals, and every mode of advertising consistent with progressive business methods will be employed to make the exhibit a profitable enterprise for the members participating. A staff of experienced salesmen will be engaged, possessed of mechanical educations in the lines to be demonstrated, writing rooms and private conversation rooms will be maintained, and buyers will be served as carefully and as thoroughly as would be possible at the home offices of the respective members.

The "community" idea has been in vogue in Germany for many years, and has proven convenient for the buyer and profitable for the manufacturer, but this is the first time that such an enterprise has taken root in England.

A comprehensive system of reports between Europe and America will keep the members in close touch with foreign conditions, and it is anticipated that a large increase in exports will attend this new movement.

# New Electrically-Driven Mill.

*Exclusively Contributed to* COTTON.

Electric driving for cotton mills is certainly on the increase in Lancashire, England, and now that the electrical engineers understand the conditions of the industry better than they did a few years back, we are certain that many successful installations will result. There is being brought to bear upon the subject more expert knowledge and the advice of some of the consulting engineers in Lancashire, who have been acquainted with mill drives for many years, has been taken, so that the electrical engineers will be able to compete on level ground with the steam engineers who have been almost monopolists in relation to cotton mill driving for many years.

The Premier Mill, which is situated in the Tame Valley, Stalybridge, England, is almost unique, being built entirely on the shed principle in a similar manner to the Cromer Mill at Middleton. This method of construction, while taking up a considerable amount of space, has many advantages, inasmuch as the cotton can pass through the various processes in a progressive line and need not be returned to any department or leave one level. Handling is much facilitated and labor cost considerably reduced.

The electric drive has been installed at the Premier Mill. Three-phase current is furnished direct from the Stalybridge, Hyde, Mossley and Dukinfield Joint Boards' Main Generating Station, being transmitted at a pressure of 6,000 volts to the mill, where it is reduced by means of three 250 K. W. Westinghouse transformers to 400 volts, and distributed to the motors in the mill at this

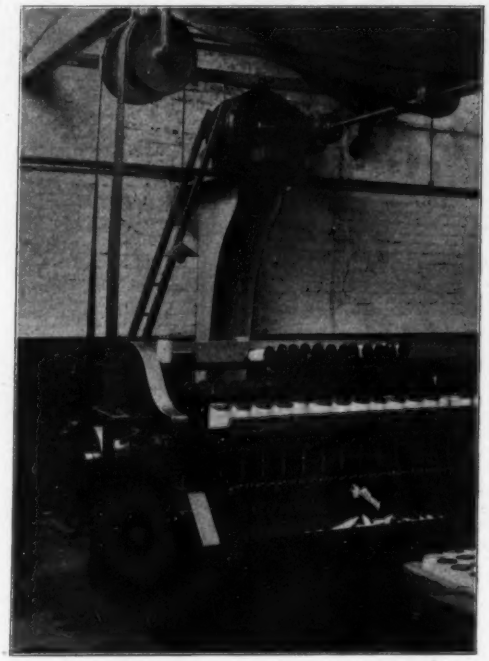

FIG. 2.

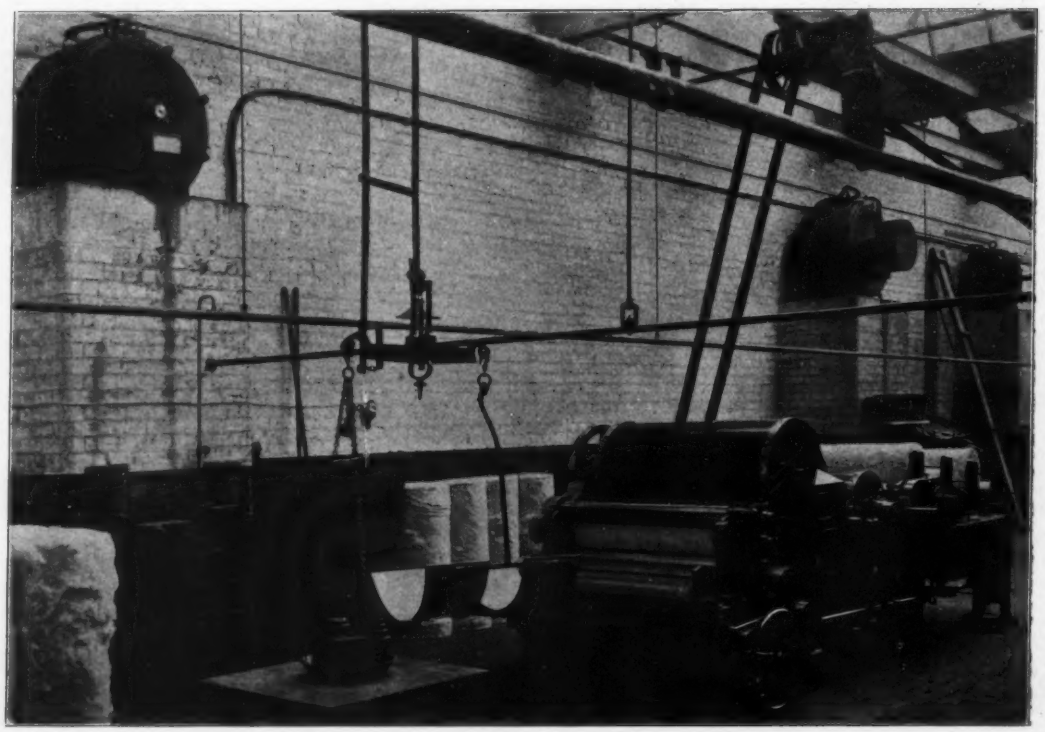

FIG. 1.

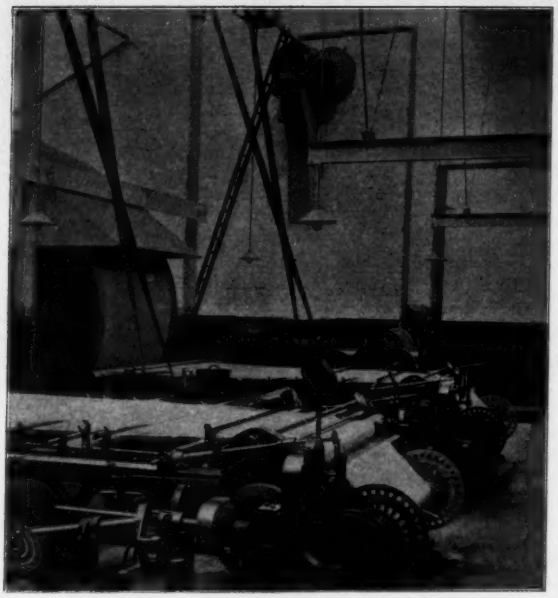

Fig. 3.

pressure, the control of the various circuits, as well as the transformers, already mentioned, being carried out by means of a Farranti switchboard.

The motors are of the induction type, and wherever the conditions will permit, a squirrel-cage rotor is employed. This is the case in all instances except the two 150 H. P. motors operating ring spinning frames, and the 80 H. P. machine driving the slubbing and roving frames, which are of the slip-ring type. The former, of course, offer great advantage in that there are no rubbing contacts or other parts whatever between the rotor and stator other than the journals, whereas with the latter, current has to be collected from the rotating part by means of brushes bearing on rings, these brushes and rings being entirely enclosed.

Fig. 1 shows a portion of the blowing room. The 40 H. P. squirrel cage machine seen at the extreme right, drives the machinery in this room as well as the bale breaker and lattice which are in an adjacent room. The slip ring motor (80 H. P.) is direct connected to the line shaft running at 580 r. p. m. from which slubbing and roving frames are driven by means of half-cross belts, this high-speed shafting permitting the use of pulleys of approximately the same diameter on the shaft and frame, with the result that an excellent drive is obtained.

Fig. 4.

The carding machines and drawing frames are driven in a somewhat similar manner from the 60 H. P. squirrel cage motor shown in Fig. 1 at the left.

The ring room is operated by two 150 H. P. slip ring motors running at 570 r. p. m. and direct connected to the line shafts.

Figs. 2 and 3 show a 7½ H. P. and 15 H. P. squirrel-cage motor running at 580 r. p. m. driving winding frames and sizing machines respectively. These motors carry reduction gear which is entirely enclosed, the second motion shaft being directly coupled to the line shaft.

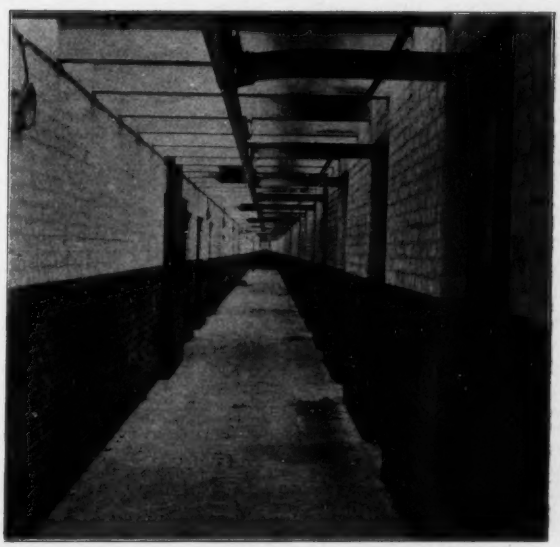

Fig. 5.

The driving of the weaving shed presents one or two unique features, direct connection of the motor to the cross-shafts being adopted, necessitating, since the motors run at 570 r. p. m. quite small pulleys on the shafts to get the desired speed on the driving pulley of the looms.

Fig. 4 shows the motor alley, the motors being carried on girders from side to side as seen on Fig. 5, which is a view taken below the machines. It will be noticed that this alley constitutes the main passage in the mill, and consequently no useful space is occupied by the motors. This figure also shows the overhead railway for carrying the warp beams from the preparing side to the weaving shed. The motors driving the shaft comprise nine 60 H. P. squirrel-cage machines, each direct connected to one cross-shaft as already stated, on which is carried a rope pulley which drives two other cross-shafts at the same speed, one to the right and one to the left. The steadiness of these drives can be well appreciated from the figures mentioned, when it is pointed out that the photographs from which these blocks were made, were taken while the mill was running.

We will not here point out the many claims of superi-

ority made for the electric drive in textile mills, but we would wish to draw attention to the absence of heavy drives shown in all the figures, as well as the brightness and business-like appearance of the mill, and the fact that no floor space whatever is occupied by the driving machinery.

## WELFARE WORK.

### The Dan River Power & Manufacturing Co. Money Contributed for Building and Support of Schools. A Hospital, Doctor and Nurse Free. Churches and Places of Entertainment.

The mills of the Dan River & Power Manufacturing Company are situated in Pittsylvania County, about two miles from Danville, Va. There are 3,500 people in the village of Schoolfield, named for the president of the company. The location and plan of the village itself is worthy of notice. The streets, running at right angles to and on both sides of the Southern Railroad, are so arranged that the group of mill buildings, stores, etc., is nearly the center and afford operatives easy access to and from their work. Every street is provided with electric lights, and with pipe lines carrying pure, filtered water to hydrants conveniently located for every house. The houses are detached, being in most cases double, four-room cottages and are located so as to obtain the best natural sanitation and drainage, and each house has ample yard space, and in most cases room for gardens, chickens and children. There is a public grazing for the cows; most of the operatives keep chickens and cows. A day nursery is in operation, a nominal cost of five cents per day being charged. The children are received at 6.30, cared for, fed and returned when the mothers call for them. A free kindergarten is maintained, and will be enlarged as the need grows. There is a night school maintained at the expense of the company.

The company lent the county money to build the public school and supplements the county funds, which only keep the schools five months, so that this one is run for a full nine months' term.

The greatest need of these people is education. The children are the only hope, as the adults are past helping, almost, owing to the fact that they are an agricultural people, lazy and shiftless, and suddenly transplanted in new surroundings. They can not make a new growth in an entirely new direction. We have no compulsory education laws in Virginia, and very inadquate provision for those who will go to school, consequently you can see that the educational problem rests largely upon the mills, and they are the only ones who seem to recognize it or try to meet it.

The company also has a hospital within easy access of the mills, not more than a city block; also a doctor within call, and all emergency cases receive immediate attention. A district nurse gives her time and attention free, and in times of such sickness the company has provided as many nurses as the doctors asked for.

In the new business block there is an assembly hall for the use of the operatives and secret orders, such as Odd Fellows, Masons, Junior Order of American Mechanics, etc. Later the company expects to open a reading room. One of the buildings is occupied as a barber shop, with a system of public baths, and another is equipped with a first-class set of bowling alleys, pool table, etc., and is conducted under such auspices as insures a wholesome moral atmosphere and prevents any drinking or disorder.

There are four churches in the village, two of the preachers being residents of the village. A car line runs from the city, and there are special rates for workmen, so the operatives are under no coercion to live at Schoolfield. A children's garden is being conducted for the kindergarten, and we hope to extend it to the children of the public school. The management is most liberal, and welfare work has kept pace with the industrial development and will do so. The mill itself is new and built upon the most modern and approved plan for the good of employers and employees.—Mrs. W. T. Harris.

## SLIDING SCALE FOR WAGES.

### Based On Profits.

The *Yorkshire Observer,* England, in a recent issue, editorially says: The hope of the moment with regard to the cotton trade is that there may emerge from the present stoppage—wanton (almost) as it has seemed not only to outsiders, but to probably a large majority within the trade itself—a sliding scale arrangement, by which wages may in future be regulated in a fixed relation to the breadth of the profit-margin.

Be it noted that the basis of the proposed sliding scale is the rise and fall of profits, not of selling prices. The selling price basis has become familiar in regard to iron trade wage arbitration arrangements; but obviously it would not serve in the cotton-spinning, excepting with such modifications in regard to price fluctuations in the raw material as would make the basis really one of profit-margin.

The suggestion is that taking the 1898 conditions of the industry as a standard, every rise or fall of 2 per cent. in the profit should be followed by a rise or fall of 2½ per cent. in wages. The acceptance of this, and the retention of the other organized arrangements which have worked well for so many years even in the absence of the sliding scale adjunct, should secure for this great industry an indefinitely long peace as between employer and employed.

Even with such a peace the trade has still before it the formidable difficulty of which we are again vividly reminded by the just issued official report, up to August 31 last, of the International Federation of Master Cotton Spinners' and Manufacturers' Associations. The cotton spindles in existence at that date were 128,924,000, as against 114,096,000 twelve months previously; being an increase of nearly fifteen millions. These figures do indeed confirm the statement which has been repeatedly made in defense of the Lancashire speculative mill builders and furnishers that all their efforts hardly kept pace proportionately with what was going on in other countries. In this country (England) a considerable number of new mill projects have been stopped and many of those old concerns whose equipment is behind the times have been shut up for good. But, evidently, many more of them must be shut up—not to mention the painful short time interregnum—before these millions of newest spindles have enough competition space cleared for them.

In a great many mills there is more or less trouble with the drawing of the roving, owing to some difficulties or lack of attention in the dyehouse.

# Use of Electricity in Textile Factories.

EARLY APPLICATION OF ELECTRICITY AS MOTIVE POWER WAS FOR TEXTILE PURPOSES. THE GROUP DRIVE. THE INDIVIDUAL DRIVE. THE THREE-PHASE INDUCTION MOTOR.

BY C. L. DE MURALT.

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Special to COTTON.

One of the earliest applications of electricity as a motive power was in the operations of weaving and spinning in textile factories. This was but the natural result of an immediate perception of its manifold advantages in this class of work. The great steadiness of the new drive offered possibilities of higher speeds, its maintenance charges were low, it rendered skilled attendance unnecessary, and decreased the danger from accidents. These considerations, together with the small space required, the freedom from dirt, and especially the ease with which new machines may be installed entirely independent of existing conditions soon resulted in a general adoption of the electric drive in a large proportion of the most important mills.

The most apparent application of electricity was quite naturally in the driving of a countershaft, from which a number of relatively small machines were driven by a standard type of motor. This method of "group driving" is still the best solution where a large number of comparatively small machines can be located so as to be conveniently driven from a common countershaft. In certain cases even heavy machines, requiring considerable power, can be advantageously operated by a "group drive." This is due to the fact that with an individual motor drive, each motor would have to be larger than actually necessary for operating the machines, to provide for the high starting torque required. An example of such a case is shown in Fig. 1 where seventeen buckskin looms are driven from two countershafts operated by a 17 H. P. continuous current motor. The possibility of all the machines being started at the same time is so remote that the group drive does not require a motor proportionately as large as with individual motors.

A typical example of the group drive as applied to the operation of cotton mill machinery is illustrated in Fig. 2. Five comparatively light machines, four looms and a twisting frame, are driven from a countershaft which derives its power from a 5 H.P. continuous current motor. This motor, as is clearly shown in the illustration, is mounted upon a wall bracket, thus requiring no floor space.

FIG. 1. GROUP DRIVE FOR SEVENTEEN LOOMS.

The starting switch and fuses are placed on the wall directly below the motor.

This particular machine was the subject of a thorough test recently, and as the results may prove of interest in comparison with results shown by other drives, we append them below. A brake test of the power developed was first made, which showed that the motor when running at 1250 r. p. m. and producing 5 H. P. consumed 10 amperes at a pressure of 440 volts. The energy consumption per brake-horse-power therefore is $\frac{440 \times 10}{5} = 880$ watts or 0.80 K.W.

The power input under various conditions of load was then measured, from which the power required to drive the various machines and shafting was computed. The consumption of energy under these different conditions were as follows:

1. Motor running light, without belt .....0.87 H.P.
2. Countershaft without belts to looms ...0.52 H.P.
3. Loom driving belts .....0.18 H.P.
4. Twisting frame with 60 spindles .....1.10 H.P.
5. First loom, 8 healds and 4 shuttles working .....0.46 H.P.
6. Second loom, 14 healds and 3 shuttles working .....0.42 H.P.
7. Third loom, 8 healds and 5 shuttles working .....0.42 H.P.
8. Fourth loom, 8 healds and 4 shuttles working .....0.44 H.P.

The total energy consumption, therefore, with all machines in operation was 4.3 H. P. It might be noted that the number of shuttle impulses was about 78 per minute, and the cloth woven was heavy buckskin, exclusively, 63 inches in width. Since making these tests, a second twisting frame has been added to the load on this motor, and it carries the six machines without difficulty.

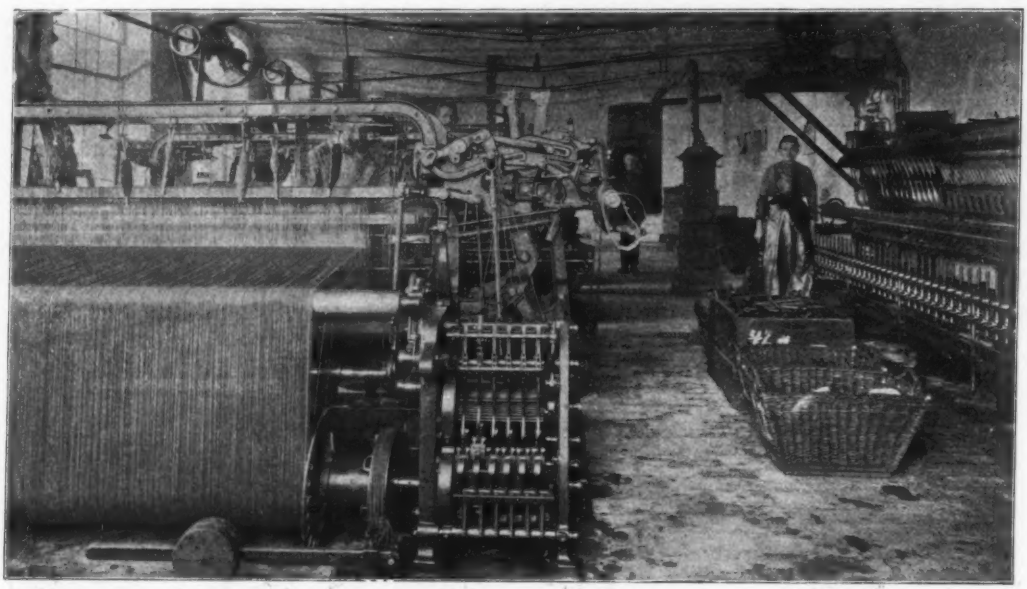


FIG. 2. GROUP DRIVE.

In the textile industry, as in other manufacturing lines, it soon became evident that the electric motor driving its individual machine formed the ideal solution for many cases that arose from special conditions. The individual drive was at first only applied to large machines where a motor especially adapted to the nature of the load on the driven machines could be most advantageously used.

With the development of the three-phase squirrel cage type induction motor, there was available a motor both cheap and durable which was so compact, so simple of construction, and so readily able to start under a full load without an elaborate starting apparatus, that it at once proved its superiority for driving looms, spooling and winding frames, warping machines and the like.

The greatest advantage, however, possessed by the three-phase induction motor lies in its inherently constant speed. As the result of this desirable characteristic, each machine may be either stopped or started without affecting the speed of the other machines in any way. The momentary variations in speed which are due to change of load of some machines, and thus unavoidable where several machines are driven from a countershaft, are entirely eliminated by the use of the three-phase induction motor, which consequently results in the production by the loom of both better and more uniform work, free from breakages in the thread, even in the finer fabrics. Furthermore, by the use of the induction motor, the looms may be operated at a higher speed, which, together with a less number of stops during working, results in a greatly increased output for each loom, and a correspondingly increased capacity of the entire mill. These considerations, together with the numerous minor advantages of the three-phase induction motor have led to its adoption to a very great extent in electrical installations in cotton mills.

It might not be amiss at just this point to briefly describe the processes used in the production of woolen cloth, and the manner in which an electric drive was applied to the operation of the various machines in a typical textile manufactory under quite exceptional conditions.

In the wool washing room where the raw wool is first washed or dyed, the washing machine and two cloth dyeing vats were belted to a countershaft driven by totally enclosed three-phase motors of 3¾ H. P. output, at 750 r. p. m. The satisfactory operation of this motor under such conditions affords but another illustration of the durability and versatility of the three-phase induction motor, for, as is well known, an extremely damp atmosphere, such as is found in a wool washing room is one of the most unfavorable conditions under which an electric motor must operate.

After a thorough drying, the wool next goes to a "willying machine" in which the tufts of wool are opened by means of sharp steel teeth on a rotating cylinder. In this particular installation, two willying machines were driven by 7½ H. P. three-phase induction motor fastened to the ceiling.

The next operation in the preparation of the wool is performed by the carding-engines, which further separate the wool into its fibers. Since the wool passes continuously through these mechines they are driven from a common shaft by a 7½ H.P. induction motor.

Fig. 3. represents a typical installation. Two spinning-mules are shown, which take the loosely formed strands from the carding-engine and spin and wind them on spindles. As is shown in the illustration, the driving motor of 15 H.P. output at 1500 r. p. m. is mounted upon a girder and directly coupled to a short countershaft from which the two spinning-mules are driven. The warping machine, which takes the thread produced by the mules and winds them on a broad cylinder preparatory to working on the looms, was operated by an individual ½ H. P. induction motor running at 1500 r. p. m.

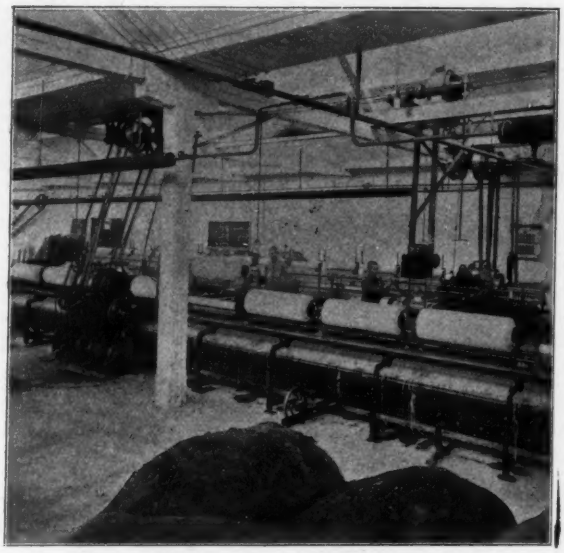


FIG. 3. AN ELECTRICAL INSTALLATION FOR MULES.

In all these operations upon a dry and highly inflammable material another very striking advantage of the squirrel-cage type of motor is brought into prominence. This is the elimination of the dangers from fire due to the sparking of the motor. In a continuous current motor, sparking at the brushes of the commutator, which may be the result of any one of a number of different causes, is an ever present source of danger from fire. On the other hand, the squirrel-cage induction motor has no brushes. As a matter of fact it has no sliding contacts whatever, and any risk engendered from such a cause is entirely eliminated.

From the mules and warping machines, the threads next go to the loom. In Fig. 4, an individual motor is shown driving a loom. The motor is mounted on an iron bracket and geared to the loom by means of a raw-hide pinion. In order to permit a small variation in speed, the motor is made adjustable on the bracket, so that a larger or smaller pinion may be used. Larger variations of speed are obtained by changing the small bevel gear on the cog-wheel shaft.

The individual system of electric drive as installed in cotton mills is also applicable to many other machines employed in textile manufacture, as, for example, combing, scutching and tentering machines, hydro-extractors and the like, as well as to the various auxiliary machinery used. Among these latter are the pumps which supply water for the operations of washing and shrinking the cloth as well as for other self-evident uses. For these, an individual motor proves to be an ideal drive. If pumping into a tank, these motors can readily be adapted to be controlled by a float which keeps the water in the tank at a predetermined level entirely automatically.

The requirements of cotton spinners for a two-speed motor for driving ring frames has led to the adoption of a special design of motor for this purpose. The two speeds for ring frames were desirable in order that two grades of thread might be spun from the same frame. The three-phase induction motor was greatly to be preferred because of its simplicity as compared with continuous current machines and its ability to run an indefinite length of time with a minimum of attention. Three requirements had to be met in the design of these machines. (a) It was requisite that these motors should develop their full rated output at both 1,000 and 750 r. p. m. (b) The operation of changing from one speed to the other should always take place with the driving belt running on the loose pulley of the spinning frame shaft. (c) The motor must be running at one of its full speeds before the frame is started.

These conditions were complied with in the design of a motor having two distinct stator windings to produce the two speeds required, the terminals of each winding being connected to a triple pole, double throw switch enclosed in an iron case to protect it from the dust. A hand wheel is attached to one end of the switch spindle, while at the other, a crank actuates a belt-shifter by means of a link motion. In starting, the hand wheel is turned through an angle of 45° in the direction corresponding to the desired speed, and as soon as the motor has come up to speed, a further movement of the hand wheel shifts the belt to the fast pulley. Although the motor is totally enclosed, a fan mounted on the rotor shaft produces sufficient ventilation so that the motor operates substantially as an open type machine of similar size.

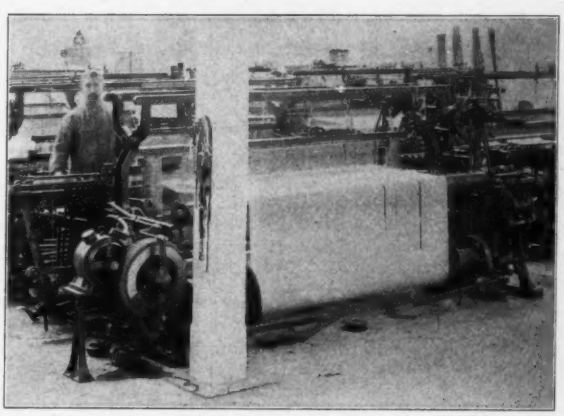


FIG. 4. LOOM DRIVEN BY AN INDIVIDUAL MOTOR.

In the manufacture of shoddy, teazing machines, whose purpose is to destroy the fabric of old material and divide it into separate fibers, are principally used. A series of tests similar to those referred to above was run upon a motor rated at 25 H. P. at 800 r. p. m. at a pressure of 440 volts. The following shows the energy consumption of five teazing machines under ordinary conditions of operation.

1. Motor running light, without belt ....2.15 H.P.
2. Countershaft with driving belts on loose pulleys .....1.65 H.P.

3. First teazer, 70-in. wide, working with shoddy .....4.12 H.P.
4. Second teazer, 78-in. wide, working with blanketing .....7.70 H.P.
5. Third teazer, 72-in. wide, working with vigogne .....3.18 H.P.
6. Fourth teazer, 72-in. wide, working with thibet cloth .....4.12 H.P.
7. Fifth teazer, of latest construction, with two swifts, 78-in. wide, working with vigogne .....4.70 H.P.

The hoppers of all the machines were kept continually full during the tests to insure steady readings and a maximum power reading for each machine was observed.

Another quite general application of electricity has been in calico printing works where small and uneconomical steam engines were employed, involving great losses through condensation in the long supply mains, and requiring far more attention than electric motors. The chief advantage of the motor drive, and which was principally the cause of its adoption in calico printing work, was the possibility it offered for a simple and exact method of speed regulation which was decidedly superior to the various mechanical speed changing devices involving cone pulleys and gearing, and consequent complications.

By the use of the commutating pole shunt motor, a standard equipment may be furnished affording a speed variation up to one to twelve for driving calico printing machines. These motors, when the speeds have been adjusted to any given value by the field rheostat, run at that constant speed regardless of load, and in either direction without shifting the brushes.

In bleaching and dye-works also, the electric drive has opened up a large field of usefulness. The totally enclosed and waterproof types of motors have made possible the use of electricity for driving chlorinating and acid machines in bleaching works where there is a large proportion of moisture and acid fumes present in the atmosphere, and for similar considerations, they are also extensively used in dye-works.

## PRICE A FACTOR IN THE PRODUCTION OF COTTON.

Under the new conditions it would seem probable that cotton will sooner or later go to 15 cents, and that the probabilities are that no adequate supply will come from other countries to forbid such a price.

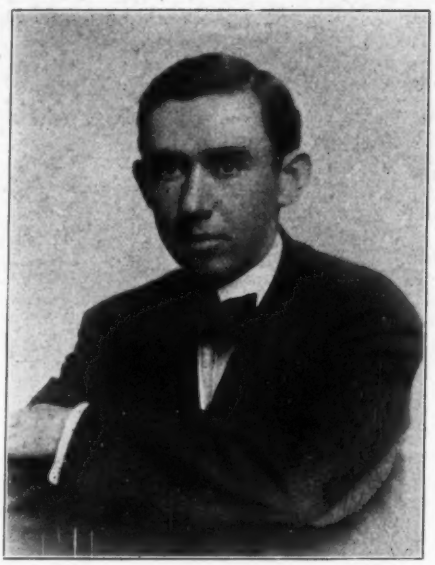
The Southern States of the American Union seem to have some peculiarly subtle advantage for the production of cotton. Climate would seem to have vastly more influence in increasing or decreasing the production than would seem to have ever been attributed to it. The islands of the West Indies all produce cotton as an indigenous plant, but some climatic or other influence prevents the production of cotton on any important commercial scale.

When the world would look about to find another source of cotton supply, it is not sufficient to find a land in which cotton will grow, because it will grow in almost any equatorial country, but it is necessary to find a country having as good soil as the cotton states of America have; having as good cotton climate; having as intelligent people, and having a system of cotton culture developed to the extent that it has been developed in America.

There is yet plenty of vacant land in the United States in the cotton producing area to produce any crop the world might want, provided the price to the farmer is maintained upon a profitable basis. This price should under no circumstances be less than 10 cents and in order that it may yield a decent living for the farmer, comparable with the living of manufacturing people in the same states, it should be about 15 cents.—D. A. TOMPKINS, at the Paris congress of spinners.

## W. H. HARRIS.

W. H. Harris, president and general manager of the Bellevue Mills Co., with offices in Atlanta, Ga., has accepted the position of treasurer and agent of the Slater Cotton Mills, Pawtucket, R. I., one of the largest cotton mill corporations in the New England States. The Slater Cotton Mills operate 52,692 spindles and manufacture white goods.



W. H. HARRIS.

Mr. Harris is a graduate of the North Carolina College of Agriculture and Mechanic Arts, Raleigh, and was formerly connected with the D. A. Tompkins Company, Charlotte, as head of the drafting department. Later he accepted the Southern agency for the Draper Company and then returned to Charlotte as assistant to Stuart W. Cramer.

He has been Southern agent for the following commission houses: T. Ashby Blythe, Philadelphia; Textile Commission Company, New York, and Grinnell-Willis Co., New York.

Mr. Harris is one of the best equipped young mill men in the South. His position as agent of the Slater Cotton Mills will relate particularly to the Southern trade.

It may be said that for the past few years American buyers have visited Saint Etienne, France, for the purpose of purchasing the higher grade fancy ribbons, and go to Basle and Barmen to place their large orders for cheap goods, which centers are the largest competitors of the American mills in this class of goods.

# COTTON MANUFACTURING

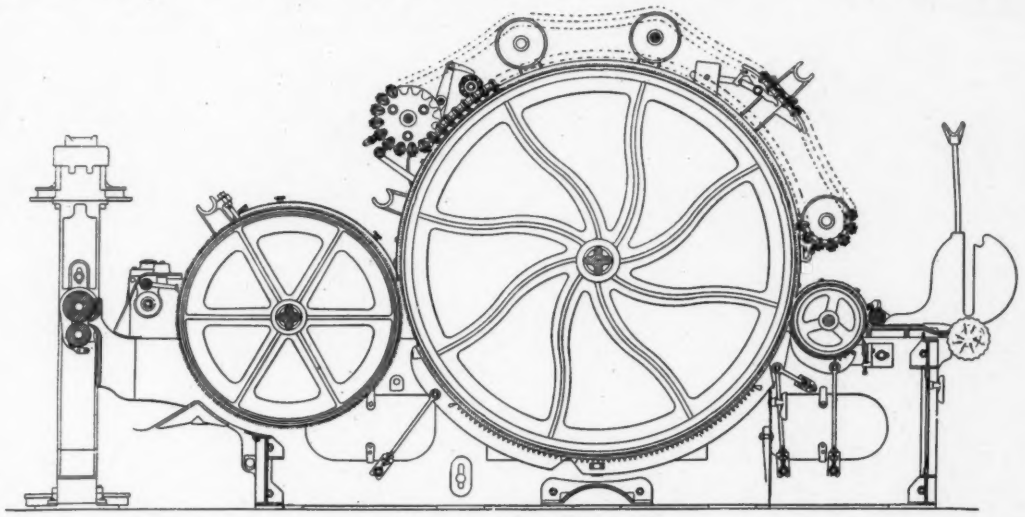
## PROCESSES IN COTTON MANUFACTURING.

THE CARD AND ITS FUNCTIONS. THE REVOLVING FLAT CARD. THE LICKER-IN. THE FEED SHOULD BE PROPERLY REGULATED. THE SETTING OF THE FLATS IS VERY IMPORTANT. THE DOFFER. SCREENS.

BY CHARLES E. BARNHARDT.

*(Continued from September.)*

If there is any one machine in use in connection with cotton spinning which is of greater importance than another, this machine is the card. There is always more or less leaf, neps and other impurities in the lap when it comes to the card from the finisher picker, and since the card is the last machine through which the stock passes which has for its principal object the removal of foreign substances which have not been eliminated by the action of the pickers, it is highly important that this machine should have special care and attention, in order that the product of the mill may be of good quality. The further object of this machine is to arrange the fibers in a parallel position as near as possible. It will be noticed on carefully examining a lap from the last process of picking, that some of the fibers which have been so closely condensed in baling and compressing are still slightly matted and adhere to each other, and have not yet to any great extent regained their natural position. In passing through the card, each fiber should be separated from the others, this effect being produced by the action of the cylinder, doffer and flats in such a manner that the fibers are further straightened out and lie side by side when delivered from this machine in the shape of a sliver.



REVOLVING FLAT CARD.

In the modern equipped mill, the revolving flat card is universally used. The old style stationary flat card has been thrown out of most of the older mills and replaced by the revolving top flat card on account of the greater production and better quality of work that this machine will produce. In placing cards in a mill they should be arranged in rows lengthways or across the building, with the coilers of the cards from the two adjoining lines facing each other. This enables the operative to more easily look after the machines, and to attend to a larger number of them than if placed in any other position. In arranging a drive for cards care should be taken that the shaft is not placed over the card, for if this is the case more or less oil will be thrown out of the bearings and fall on the clothing of the flats, causing the foundation of the clothing to deteriorate, and the wire or teeth will become loose and in many cases drop out. The only remedy in a case of this kind is to have the flats reclothed, and if this is not done the card will produce an inferior quality of work. The best and most economical drive for cards is to place the line of shafting over the alley at the front or coiler ends of the double row of cards, and drive both the rows from the same shaft, the belts driving the one row being crossed, while the belts to the other row are run straight. A great nuisance is often experienced in the belts not running properly on the card pulleys, since there is no guide on this machine to hold the belt in position. This is caused by the cards not being erected in an exactly parallel position to the driving shaft and the only remedy is to move the card enough to cause the belt to run true.

If the picking machinery is in good order and performs its work as it should, the stock when ready for the card should be pretty well freed from all foreign substances, and the fibers to a great extent disentangled and presenting a fluffy appearance. The lap when placed on the card passes over the feed plate, and underneath the feed roller which rests on the nose-shaped end of the feed plate. The feed roll should be heavily weighted in order to get an even feed and prevent the licker-in from taking in the cotton in lumps. Here the stock is very slowly presented to the action of the licker-in which carries it over the mote knives and delivers it to the cylinder of the card. The surface

speed of the cylinder, running in the same direction as the licker-in is very much greater than that of the latter and as the teeth of the clothing of the cylinder are very much finer than those of the licker-in it will be readily seen that the fibers will be stripped from the lickerin by the cylinder. The nose of the feed plate is made in different shapes, depending on the quality of cotton being used. The object to be taken into consideration is that the stock is taken from the grip of the feed roller and feed plate by the lickerin in separate fibers and not in bunches.

It will be readily understood that in working long staple cotton the nose of the feed plate must be further from the surface of the licker-in than if short staple stock is used, else the fibers will be strained or broken. Fastened to the sides of the card below the nose of the feed plate are the two mote knives, and underneath the lickerin is the screen or undercasing. The lickerin is covered with a saw tooth clothing made from thin, flat wire about one-quarter of an inch in width and about one-sixteenth of an inch thick, the teeth being formed by cutting the edge in such a manner as to resemble saw-teeth. The action of the lickerin on the fibers is somewhat similar to combing them. The stock being held tightly by the weighted feed roller and slowly presented to the action of the licker-in it will be seen that each fiber will be separated from the others and straightened out before it is released by the feed roller. The object of the mote knives is to scrape off any leaf or dust which may still remain in the stock, and regulating the amount of fly made. The mote knives should be set as near the licker-in as possible without touching it, in order to effect its cleaning purposes and make the smallest amount of fly.

The object of the screen as placed under the licker-in is to prevent the good fibers from being thrown off by the high speed of the licker-in. The lower part of this screen consists of a series of bars running from side to side, the upper portion being perforated with small holes in order to permit small impurities to fall through them and should be set as close as possible.

The feed of the card should be properly regulated, for if it is too heavy the stock will not be thoroughly cleaned and if too light the web as it is stripped from the doffer will give considerable trouble in breaking. By examining the fly from underneath the licker-in it can be readily seen whether or not the parts are properly adjusted. If too good cotton is found thrown out it is positive evidence that the feed plate, mote knives or screen are set too far apart from the licker-in, whereas if set as they should be, none of the good cotton will be wasted, and a more perfect cleaning will be effected.

On account of the higher speed of the cylinder, the cotton is taken from the licker-in by it and presented to the action of the flats. The points of the wire of the clothing on the flats are inclined in a different direction to that of the cylinder and is intended to remove the short fibers, while the sufficiently long ones will be still held to the cylinder and be combed and straightened. The clothing on the back edge or heel of the flat is ground so as to be a little shorter than the front edge in order to allow the fibers to come gradually in contact with the flats and thus preventing them from collecting at the back of the flats. The surface of the flats is ground to the proper bevel before ever being used and is maintained in all subsequent grinding by means of guideways, the amount of the bevel of which corresponding to the heel of the flat. The flats when in their working position are supported by flexible arches or bends by means of which the flats are set to their proper distance from the cylinder.

The setting of the flats is a very important matter and one which requires considerable experience. If set too far from the cylinder it will cause neps or bunches of short fibers to be formed in the web, while if set too close the clothing will be damaged by rubbing and the stock will appear as if it had not been carded. Some of the builders provide their cards with indicators by means of which the distance of the flats from the cylinder can be readily seen and adjusted, however, this is such an important matter that it is always best to test the setting with a gauge rather than depend entirely on any other arrangement.

In setting the flats with a gauge the pulley which drives the flats is removed and a handle placed on the end of the shaft by means of which the flats can be turned. About five or six flats should be removed at intervals in order that the gauge may be admitted, the flats should then be turned around several times by means of the handle, a test with the gauge being made at every setting point, each time the space where a flat has been removed is over the part of the arch where the screw is placed for making these adjustments, and this operation continued until the gauge shows that the setting is the same in all positions, since the points properly set will be changed if any other point is moved. This is a matter which requires some skill and should be always carefully done.

The short fibers or strippings are removed from the flats by means of a slowly oscillating comb at the delivery end of the machine. The strippings on being removed by this comb are either wound on a round flannel-covered roll supported underneath the comb by springs, or are allowed to drop on the cover of the doffer, from which place they are removed by the operator. In addition to the comb the flats are further cleaned by means of a revolving brush with very stiff bristles known as the stripping brush, which is itself cleaned by a stationary comb.

After the stock has been carded by the action of the cylinder and flats it is transferred to the doffer. The surfaces of the cylinder and doffer run in the same direction, while the speed of the doffer is very much less than that of the cylinder, and the clothing of each point in the opposite direction at the point of contact. Thus it will be seen that the doffer clothing acts somewhat as a series of hooks upon which the fibers are drawn from the cylinder and deposited on the surface of the doffer in a more condensed form than on the cylinder, on account of its being of a much smaller diameter and running at a very low rate of speed.

The cotton is taken from the doffer by means of a very rapidly vibrating comb, the web or sheet of cotton thus removed being passed through a set of calender rolls which condenses it into a sliver, and is drawn upwards by the rolls of the coiler and deposited in the roving can. Trouble is sometimes experienced by the web from the doffer tending to hang down and continually breaking. This trouble is usually caused by the doffer comb not being set in the right position, and can generally be overcome by slightly changing it to one position or another until the desired effect is produced. Some builders provide their cards with a slow doffer motion by means of which the speed of the doffer is reduced at will by bringing into play an extra set

of gears. The advantage of this slow motion is found in piecing up an end, since by moving the shipper handle the extra set of gears are brought into play, reducing the speed of the doffer to five or six revolutions per minute. However, it does not always meet with universal approval from the fact that the machine is often carelessly left running on the slow speed thus cutting down the production of the card one-half or more.

The cylinder screen as found underneath the cylinder is made in two parts, hinged in the center and consists of a series of bars running from side to side of the machine. The object of this screen is to prevent the fibers from being thrown off the cylinder by centrifugal force, the openings in it being to allow any other substances to be deposited under the card. The end of the grid or screen nearest the doffer does not extend to the point of contact between the cylinder and doffer, but is left some distance from the wire of the doffer so as to prevent any short fibers from accumulating between it and the doffer at this point.

The amount of waste made at the card varies from four to eight per cent., depending on the quality of stock being used and how it has been treated in its passage through the preparatory machines. The fly from underneath the licker-in should be taken out every day or two, this depending on the amount being extracted, while once or twice a week is usually often enough to clean out from under the cylinder on account of there being less thrown out here than under the licker-in; however, it should never be allowed to accumulate in a very great quantity as it would then be liable to be caught up by the cylinder and pass with the good cotton on to the doffer, producing a cloudy web.

*(To be continued.)*

## PREPARATORY TO SPINNING.

### Mechanical Development for Preparing Cotton for Spinning. Improved Efficiency and Economy.

BY ROBERT C. CHILD.

The primary manufacture from the raw fiber is always popularly regarded as the spun yarn, though no experienced person having to do with textile production is ignorant of what the developments of now nearly two centuries in the use of machinery demand in the way of preparation for the spinning machine. Two or three agile persons with a basket of ginned cotton could with only their bare hands, doubtless feed to the drawing rolls for one spindle of a modern ring-frame, or even a mule, a sufficient stream of fiber to form some sort of yarn. That would be a fairly interesting experiment, when trying to form an estimate of the immense efficiency of the preparatory machines, for a battery of these in a modern mill, containing but a single representative of each machine in the train, until nearly the point for the spinning machinery proper (and then only a few machines working abreast) is sufficient for a whole mill full of spindles. The two or three agile persons, to do the same work, irregularly and poorly, by hand, would have to become some twenty or thirty thousand persons! And if we could pursue such an absurdity to its conclusion, it would become evident that each one of those persons would have to become a paragon of skill to approach even remotely the regularity and perfection of the prepared roving about to be attenuated and twisted in the spinning frame or mule into the sound, even yarn which is to form the essential basis for whatever there is of regularity, fineness and beauty in the finished fabric.

Something of the steps to avoid labor and secure mechanical perfection in what one was doing would necessarily occur to any intelligent person engaged in this supposititious congregation. As the matter has actually evolved, the spinning machine has been the indicator of the progress made, always being able to outstrip, by sheer duplication of its spindles, the labors of those supplying it.

A single source of raw fiber, beginning at the basket or distaff at the hand of a woman with hand-cards, would barely keep busy two other women with spinning-wheels. The carding-engine multiplied the carding-woman many thousand fold, but the carding engine had to be fed, and there was still labor between it and the raw fiber. Invention and improvement have been busy in this primary interval, between the agricultural product and the spinning-frame, and it may be interesting to look at some of the details.

In 1890, Joseph Nasmith, in his excellent work on English cotton spinning machinery, estimated the increase in production of the mule, since 1834, for practically the same number of persons engaged, at 60 per cent. of the product in the earlier year, while the difference in price between the raw cotton and manufactured yarn had dropped from 5⅜ pence to 2⅛ pence per pound. Some of this gain was at the mule, undoubtedly, but it is probable that more of it came in earlier in the process.

To fix our ideas, it may be well to state again the usual steps in a modern mill using baled cotton, as all mills must. The accompanying table shows the ten distinct operations used for good yarns before reaching the spinning machine, and the five additional operations in use for yarns of fine quality. At every point in this descent from an impacted mass of entangled and dirty fiber to a cleaned, refined roving free from neps, foreign matter, immature and short fibers, in which the fibers lie parallel and slightly twisted, and which is of such regularity that every yard of it contains very nearly the same number of fibers as every other yard, one of the ten or fifteen machines has contributed something to the result gained, and during the last half-century each one of these devices has been measurably improved. When the action of the device is no better in kind, it is greater in quantity or cheaper in attendance cost.

That cleanliness and regularity is the prime object of these machines, and the place where the manufacturer began to attempt to secure them has moved steadily toward the beginning of the series, until it has now reached the bale-breaker and can go no further, unless the farmers and ginners can be enlisted to supply a better product initially. But it would be a rash person who implied that the machines of this series will not be improved or replaced by better ones.

The bale-breaker or opener, at the foundation of this series, has the heavy work of reducing the compressed mass from the bale to working condition for lighter machines. Until recently, the device most used was the same familiar draught mechanism, the most persistent of all mechanisms in the textile art, a series of increasingly speeded fluted or spiked rolls, which appears everywhere to replace the plucking motion of two human hands to draw out a mass of fiber, one part against another. But the duty at the bale-breaker

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| BALE OF RAW COTTON to BALE BREAKER to MIXING BINS to OPENER BEATER | Selection and mechanical condition of fiber-mass. |
| BREAKER SCUTCHER to FINISHER SCUTCHER to CARDING MACHINE | Removal of foreign substances. Beginning of arrangement of fibers. |
| DRAWING and EVENING FRAME | Attenuation, averaging amount per unit length and parallelising fibers. |
| SLIVERLAP MACHINE to RIBBONLAP MACHINE to COMBING MACHINE to DRAWING FRAME | Refined parallelising and attenuation for fine quality of yarn. Fibers of short length rejected. |
| SLUBBING FRAME to INTERMEDIATE (ROVING) FRAME to ROVING FRAME | Further attenuation and slight twisting. |
| SECOND ROVING FRAME | Fine quality yarns only. |

rolls is measured in pounds and hundred weight, where it will become at the draught-rolls of the spinning frame grains only, and a corresponding coarseness and weight of machine is necessary. The man feeding the machine—the first and last necessarily manual feed in the whole operation—tears off the large lumps of baled fiber, which the machine is to tear apart into reasonably small lumps, incidentally allowing the coarser impurities to drop out. If pairs of rolls only are used, the passage through the first pair of a large lump at one place in their width would separate the axes of the rolls and remove their grip from any smaller lumps then between them. The smaller lumps would then pass to the second pair unopened, and not be torn by the draught of the lighter-speeded second pair. This has been avoided by replacing the lower rolls of the machine by a series of heavily-weighted levers smooth on top where they press up against the rolls, so as to form individually yielding abutments, which will permit lumps of various sizes to be acted upon by the same roller at the same time with equal gripping effect.

Another important function also results. The delivery from the bale-breaker is the first stream of fiber to be formed, and even here, although the fiber may be merely going into storage at the mixing bins it is important to secure a uniform mass in unit length of this stream, especially if the cotton is to be worked unmixed, or if reliance is to be had upon mixing at or immediately following the opener-beater, will a constant stream be advantageous.

The levers of the bale-breaker are an integrating device of a crude sort, tending to maintain greater evenness at the delivery side of the machine by restraining the supply to the second and following rolls by at least an even tension on the various lumps, so that what each roll takes off and carries forward is more nearly representative of its surface capacity across its entire length than was the duty of its predecessors, with resulting approach to uniformity in the output.

The round cotton bale avoids the bale-breaker, since it can be unrolled like any other lap into the original sheet of cotton. The universal need for careful mixing somewhat negatives this advantage, if the mixing is to be done by hand, since what the mixer needs is to have his supply bins of the different sorts of cotton full of cotton of uniform density, so that equal volumes will represent equal amounts of fiber. Hence, the use of the round bale indicates the use of some sort of picker or opener between the bale and the mixing. But it is conceivable that if all the supply of cotton to be mixed was in round bales, the mixing could be automatically done by unrolling bales of each sort at different spreads, drawing out the slower bats and then tearing up the superposed bats together at the opener-beater.

*(To be continued.)*

## ETAMINES.

The term "etamines" originally referred to a stiff cloth so made to be used as a sieve or screen. It is of French origin, and the term itself means a sieve or screen. The characteristic originally was that it was made of ply warp and filling, which left interstices so that a sifting process could take place properly. That was the original true etamine.

Naturally, this construction of fabric was not suitable for dress goods or other purposes, or as wearing apparel. In its original form it subsequently became used for curtains and embroidery foundations, having added thereto, when so used either in the process of construction or subsequently, effects adapting them peculiarly to their use. When so constructed and applied, in most cases the fabric was naturally so changed as to become known in trade and commerce, and bought and sold under another and different name and designation.

Etamines made of wool were soft and pliable, and, therefore, readily adaptable to dress goods. Consequently, it is found that years before any etamine construction of cotton could be devoted to dress goods the sole etamine as used for dress goods was the woolen etamine.

Subsequently and after the passage of the tariff of 1897, the process of mercerizing became known and used in trade. The process of dyeing also was much improved. By reason of the use of these improved processes it has become possible, after the passage of the act of 1897, to so construct a fabric of etamine construction, that is sufficiently soft and pliable to be used as dress goods.

## THE REVOLVING FLAT CARD.

The revolving flat card is a carefully designed and well built machine, capable of fine adjustment, but it too often happens that for want of proper care and attention, full advantage is not taken of its construction. Too much attention can not be given to good grinding, setting, stripping and cleaning. Clean cards and a clean card room indicate good spinning and weaving, and it is false economy to employ cheap, incompetent help on cards. Poor work from the cards can not be improved in the subsequent processes of drawing and spinning. Cases are known where, after changing from old-style cards to revolving flats in yarn mills, one cent per pound more has been obtained for yarns made from a lower grade stock, besides the greater economy of working, and much of this result was due to the methods adopted by good carders and grinders.

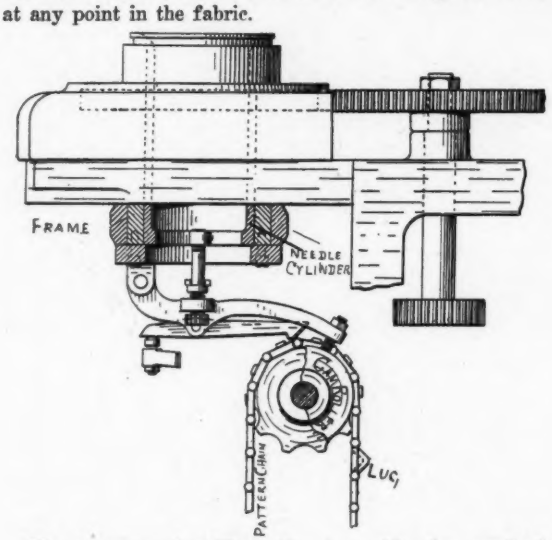
According to a patented claim, the fastness to friction of indigo-dyed woolen fabrics is greatly increased by treating the fabric, before dyeing, with solutions of metallic salts.

# KNITTING

## MEANS FOR PLACING STITCHES UPON LOOPERS.

In the manufacture of stockings or half hose upon circular knitting machines after the completion of the stocking or half hose, the stitches at the end of the toe are transferred to a looper in order to close up the opening. It is required, to produce proper work, that the fabric shall be put upon the looper in a straight line. With the course at the end of the toe of the same mesh or tightness as the contiguous courses, it is quite difficult for the operator to put the stitches upon the looper in a straight line.

It is the primary object of the device here shown to provide mechanism which causes the production of a course at the end of the toe looser than the contiguous courses so as to form a ready means of placing such stitches upon the looper, and thus place the fabric upon the looper in a straight line of stitches. The device is, however, applicable to form a course looser than the contiguous courses at any point in the fabric.




The accompanying illustration is a side view partly in section of a portion of a circular knitting machine embodying the device.

The cam roller has high and low points and operates to automatically lift and depress the needle cylinder and vary the tightness of the courses to fashion the stocking.

The arrangement is such that the main driving gear revolves once for four revolutions of the cam cylinder and thus revolves once for four courses of the fabric. Upon this gear is a cam which extends one-quarter around the cam cylinder or the distance corresponding to one course of the fabric. Upon the pattern chain, at predetermined points, where it is desired to knit the loose course, is placed a lug. When, in the movement of the pattern chain, this lug strikes a lever the needle cylinder is lifted and the mesh loosened. As the extent of this is equal only to one course, the needle cylinder is held up only for one course.

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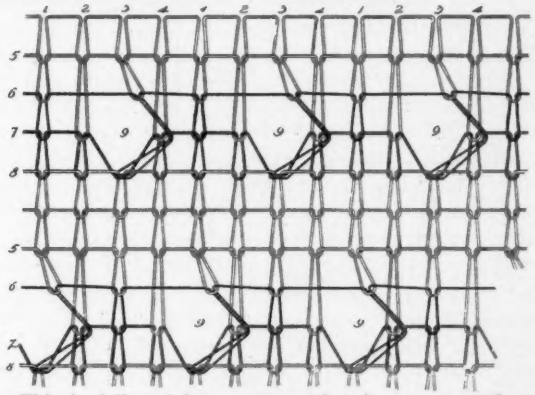
The organization of the textile industry at St. Etienne, France, is of two kinds—home looms and manufactories.

## MAKING AN OPENWORK KNITTED FABRIC.

The accompanying illustration relates to what is known as mesh or open-work knitted fabric, and the process of making the same. It has for its object to form a knitted fabric having a uniform appearance in which the holes or open portion will be well-formed and have substantially symmetrical edges.

As an illustration of one method of forming the fabric we will describe it in connection with a circular spring-needle machine. With such a machine, the yarn or material of course 5 is placed in position on the needles by the ordinary stitch wheel, but the yarn or material of course 6 is placed in position on the needles by means of a plugged stitch wheel, plugged one and one, as the word "plugged" is understood in the trade, which is so arranged that the beards of the needles which form loops 2 and 4 are closed and the yarn or the material is carried outside of the beards of the needles upon which are formed the loops 2 and 4, but under the beards of the needles upon which are formed loops 1 and 3, as the cylinder rotates.




This is followed by a presser that is cut one and one which co-acts with the plugged stitch wheel in such manner that the cut-presser presses off each needle under whose beard the plugged stitch wheel has carried the yarn, but fails to press off each needle that has no yarn placed under its beard. In this manner, needle 3 when forming course 6, is flanked upon each side by a needle that was not pressed off but which had yarn furnished to it outside of the beard, thus forming a loop on each alternate needle only and thereby providing surplus material for forming the elongated and laterally extended loop 3 of course 6 by the subsequent action of the machine. After the material of course 6 has been delivered or placed upon the needles in this manner, what may be called an interchanging wheel is caused to engage with two of the needles, as 3 and 4, so as to cause their tops to be crossed before the course is pressed down, which will cause the material forming loop 3 of this course to lie in sub-position relatively to the needle of loop 4 that when the loops are pressed down by the cloth wheel, or otherwise, so as to permit the placing of the material for the succeeding course, and the needles are released from the interchanging wheel, loop 3 will be drawn out and will extend around the needle of loop 4, and thus take up the surplus yarn or material furnished to the needles of loops 2 and 4.

The material for forming course 7 is fed to the needles by the ordinary unplugged stitch wheel which is followed by the usual wheels except that the presser wheel, cut one and three, is arranged to co-act with the interchanging wheel, so that it will not close the beard of the needle holding the closed end of loop 3 of course 6. Hence, there will be two loops retained on the last mentioned needle, while the loops on the other needles will be cast off in the ordinary manner. The material for course 8 is fed to the machine by an ordinary unplugged stitch wheel, which is followed by the ordinary wheels, whereby all of the old loops are cast off and new loops are placed thereon ready to form the ordinary fabric.

By constructing the fabric in this manner, it will have substantially the same appearance as the ordinary knitted fabric, except that it will have regular and well defined openings formed therein, the crossings of course 6 over the elongated loops 2 and 4 of course 5, without engaging therewith, not being noticeable in knitted goods.

A previous method heretofore practiced for making a lock-stitch mesh fabric on a spring needle knitting machine was to transfer the loop from one needle to an adjacent needle by causing one of two loops to be pressed down over and around the two needles and then pressing off that loop from its original needle, thus leaving the two loops upon one needle. By that method, which requires a very delicate manipulation of the loops, if the mechanism failed to cause the single loop to encircle both needles a defect, called a "drop-stitch" was the result.

Among the important advantages claimed for the present method over other methods, is the fact that no stitches or loops are transferred from one needle to another; but the loop of one needle is simply elongated and both sides of the loop carried or wrapped around the adjacent needle, without casting off or detaching the loop from its original needle, until the formation of a subsequent course. A failure of the mechanism to properly manipulate the loops, in the present method of forming the fabric, does not result in a "drop-stitch" or other noticeable defect, the only result being the formation of plain cloth where an opening was intended.

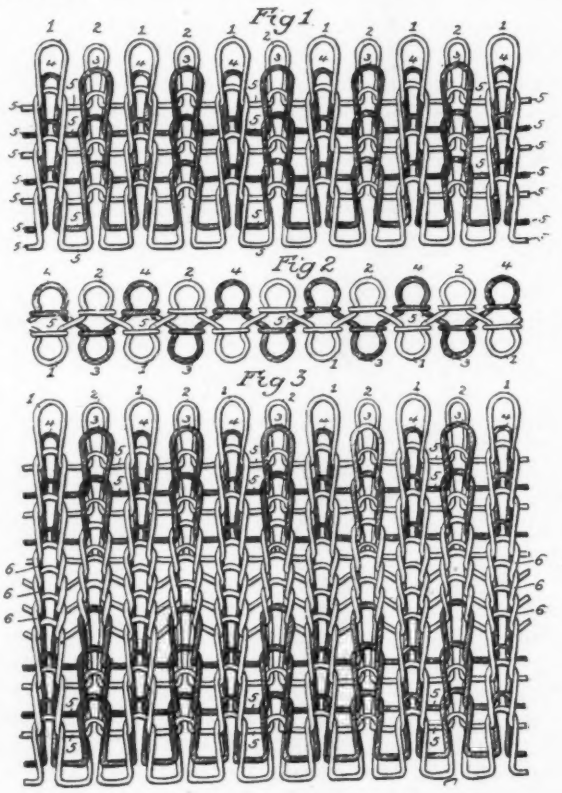
In the drawing, the wrong side of the fabric is shown, that is, the outside of the fabric as it would appear when being formed upon an ordinary circular spring-needle machine, as this view more clearly illustrates the predominating feature of the scheme, that is, the elongated and lateral bend of loop 3 of course 6, or what may be called the "interchanged" loop or stitch.

## RIBBED KNITTED WEB.

We show herewith a system of making a ribbed knitted web the object of which is to provide a ribbed fabric of uniform character and possessing the quality of elasticity characteristic of a ribbed fabric but having a closer disposition of the wales and a heavier or firmer texture than a ribbed knitted fabric produced in the usual way. This scheme also provides a ready means for producing vertical stripes or other ornamental effects in the web.

Figure 1 is an exaggerated face view of a piece of knitted fabric constructed in accordance with the scheme. Fig. 2 is an exaggerated sectional view of a piece of the fabric; Fig. 3 is a view similar to Fig. 1, but illustrating a piece of the fabric having a "welt" formation thereon; and Fig. 4 is a diagrammatic representation of the needles of a circular knitting machine adapted for the production of the fabric.

The fabric shown in Figs. 1, 2 and 3 consists of two interlocked ribbed webs with crossed sinker wales, the ribs of each face of one web being disposed in the space between the ribs of the corresponding face of the other web, thus, as shown in Figs. 1 and 2, the needle wales constituting the ribs of one face of one web, which may for convenience be termed the front face, are represented at 1 and the needle wales constituting the ribs of the back face of said web are represented at 2, the needle wales 3 constituting the ribs of the front face of the other web being disposed in the spaces between the wales 1. and the needle wales 4 constituting the ribs of the back face of said web, being disposed in the spaces between the needle wales 2, the sinker wales 5 of the two webs crossing each other.




In producing a fabric of the character described an ordinary rib knitting machine may be employed but the needles of both the cylinder and dial of the machine are disposed in independently operable sets, a needle of one set alternating with a needle of the other set both around the cylinder and around the dial, thus, as shown in Fig. 4, the cylinder needles *A* which produce the face wales 1 of one web alternate with the cylinder needles *C* which produce the face wales 3 of the other web, and in like manner the dial needles *B* which produce the back wales 2 of one web alternate with dial needles *D* which produce the back wales 4, of the other web, the dial needles *B* being in line with the cylinder needles *C* and the dial needles *D* being in line with the cylinder needles *A*.

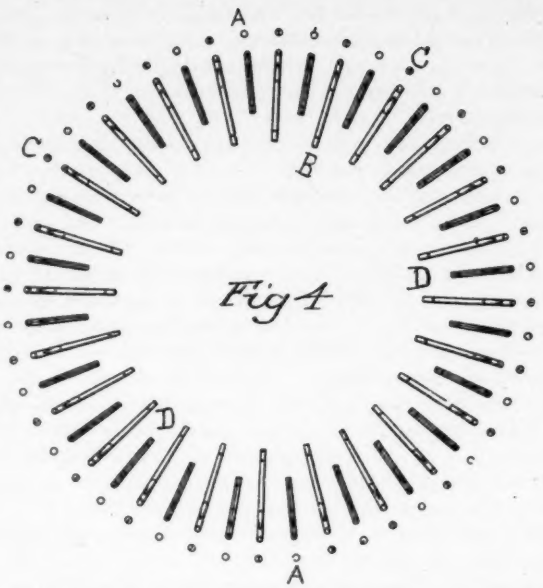


Fig 4

In order that they may be independently operated the needles of one set may be longer than the needles of the other set, or may have their projecting butts in different planes so as to be operable by different sets of cams, and the machine will be equipped with one or more yarn guides for each set of needles, one guide feeding its yarn to the needles *A* and *B* in the production of one course of the web and the next guide feeding its yarn to the needles *C* and *D* in the production of the next course of the web, whereby, while the two webs are, in effect, independent of each other and independently produced, they are so interlocked by means of their crossing sinker wales as to constitute, in effect, one fabric.

The value of this scheme in the production of ribbed fabrics of close or heavy texture will be understood when it is borne in mind that it is impracticable on an ordinary rib knitting machine, to produce a web having more than about fourteen wales to the inch, on each face, for in such ordinary rib knitting machine the dial needles alternate with the cylinder needles and consequently the whole twenty-eight needles must be crowded into one inch of space. In a machine for producing this web, however, the dial needles are in line with the cylinder needles, hence the only limit to the number of wales in the web is the limit of fineness to which each needle-carrying member of the machine can be cut, and ribbed webs can be produced having as many as twenty-four wales to the inch on each face, while the knitting operation can be carried on with the same facility as in an ordinary rib knitting machine having a gage of but twelve to the inch, in each needle carrier, owing to the fact that but one-half of the total number of needles are knitting at each feed. A ribbed fabric can, therefore, be produced having a much finer texture than usual, arising from the closer disposition of the wales.

# DYEING, BLEACHING AND FINISHING

## SOME DEFECTS IN COTTON FABRICS.

BY FREDERIC DANNERTH.

The frequently recurring claims for damages for various causes makes it very desirable for those engaged in the chemical processes of the textile industry to acquaint themselves with the pitfalls which await them. It is for this reason chiefly that an attempt has been made in the following to enumerate some of the defects encountered in cotton manufacture. A defect may be defined as that which makes a fabric imperfect and so impairs its value. If a perfect fabric be called "normal" the defective product may well be called "abnormal," just as the physician applies this term to one who is sick or is deformed. Following the analogy it is possible to determine the cause, remedy and characteristic of each defect and discover preventives for the same. In the following, these defects will be classed as far as possible according to the process in which they occur.

### BLEACHING.

*Lime Spots.* These may have originated in the imperfect straining of the chloride of lime whereby solid particles have been introduced into the bleachbath. If the goods remain white, they will be tendered at this point, or if they are dyed, these parts on which the particles of lime have been deposited will be dyed darker than the rest of the fabric. The remedy lies in avoiding the cause.

*Rosin Spots.* Due to undissolved particles of rosin (colophony). By boiling with soda ash solution after the rosin boil, the complete removal of fatty matters and undissolved rosin is ensured. Lime spots and rosin spots may be detected by dyeing a sample of the bleached fabric with alizarin.

*Bleach Spots.* Due to the formation of oxy-cellulose. It may be caused by using strong bleach liquors or by exposing the goods to the air for a long time after the bleach bath. The carbon dioxide of the air sets free the hypochlorous acid of the bleaching powder and this in turn oxidizes the cotton. Such spots may be recognized by dyeing the bleached fabric in a solution of methylene blue containing one gram of dye per liter. After allowing the previously wetted sample to remain in this solution for five or ten minutes it is removed and washed in distilled water. Those portions which have been affected will be dyed a much more intense blue than the rest of the sample. These spots may sometimes be detected by boiling the sample for five minutes in a dilute Fehling solution. The presence of oxy-cellulose is indicated by a red deposit on the fabric of cuprous oxide more or less intense.

*Rust Spots.* These may be due to
in the water. They possess the fami
of iron rust. By applying oxalic
soluble oxalate of iron is formed a
moved by rinsing. Boiling and ble
kept as clean as possible and n

lowed to remain in the water and steam supply pipes. To test water for the presence of iron one liter of the same should be evaporated down to about 50 cubic centimeters and a few drops of nitric acid added. If potassium sulphocyanide be now added to the concentrated liquid a red coloration will be obtained if iron is present.

*Gray Cast.* This may be due to the formation of lime soaps on the fabric in the final softening bath. These soaps are insoluble and in no case colored white. They interfere with the softening of the goods. Use purified water. It may be said in general that an upland surface water is a very desirable material if good results are to be obtained in bleaching.

*Harsh Feel.* As has been intimated above, this defect is due to the formation of the hard lime soaps. A fabric supposed to contain this substance may be examined in the laboratory as follows: Treat the sample in a porcelain dish with dilute hydrochloric acid. The soap is thereby decomposed into calcium chloride and the fatty acid. The sample is now dried in the air and then extracted with ethyl ether in order to dissolve the fatty matter. The determination may be made quantitatively if desired.

*Tender Goods.* This defect, otherwise known as "rottenness," may be due to a variety of causes. Thus the boiling-off may have been done too violently, or with very concentrated liquor or the goods may have been partly exposed to the air during this operation. Then again the bleach bath may have been too strong or the chemic may have been imperfectly removed or the acid may not have been washed out of the goods very thoroughly.

If an "antichlor" bath is used instead of the "sour" bath the liquor must occasionally be tested in order to make sure that it is still capable of destroying the chlorine in the goods. The oxy-cellulose produced by excessive bleaching frequently goes unnoticed until the goods have been sold and washed in soap water. The fabric then appears as if it had been riddled with bullets.

TURKEY RED.

*Ink Spots.* These may be due to the presence of iron in the water or in any of the chemicals used in the process. They assert themselves in the operation of sumaching (emulsion or old-style red). In this case, particularly, it is necessary to avoid any possible formation of the spots by previously examining the materials used in the process.

*Tender Goods.* In the old-style process the goods are impregnated with oil, piled over night, and then hung in the drying-room at a temperature of 50 degrees centigrade. The steam which is given off in the drying operation must be carried off, and even after they are removed from the chamber the goods should not be piled in dense heaps. Both instances may give rise to "scorched yarn," owing to local overheating of the fibers.

*Dull Reds.* These are caused by the presence of iron in the water or other chemicals used. They are due to the fact that the iron-alizarin lakes are of a much darker color than the fiery aluminum-alizarin lakes. The remedy lies in removing the cause.

ANILIN BLACK.

*Greening.* The greening, or "after-greening" as it is sometimes called, is due to the fact that the emeraldin has not been completely oxidized to nigranilin or true anilin black. This last step in the production of a good black is usually accomplished by placing the goods in a bath of biehromate of potash. In some instances the after-greening is due to the fact that the anilin black has been reduced to the green emeraldin. The fastness of a fabric to "greening" may be determined in the laboratory by immersing the sample in an aqueous solution of sulphurous acid.

*Tender Goods.* This defect may be due to the action of the hydrochloric contained in the anilin salt.

The production of anilin black is in all cases accompanied with the danger of rotting, so that it remains for the workman to reduce the action of the various agencies to a minimum. Prudhomme has suggested the use of yellow prussiate of potash (potassium ferrocyanide) in the padding solution. In this case potassium chloride and anilin ferrocyanide is formed, and the danger of tendering is reduced to almost zero.

*Crocking.* This defect is characteristic of the one-bath anilin blacks. The goods are padded and dyed in the same bath so that there is always a certain amount of anilin black produced *on* the fiber in addition to that which is produced *in* the fiber and *in* the dyebath. A partial remedy lies in keeping the liquor cold and adding the hydrochloric acid only gradually.

DIAZO COLORS. PREPARING, ETC.

*Naphtol Spots.* If cotton goods which have been prepared with naphtol are allowed to lie in the air exposed to light before completing the production of the red, a brown color will appear. Lauber and Caberti have patented a process for the prevention of this defect by the addition of an alkaline solution of antimony oxide to the naphtol prepare. The danger of the production of the spots is especially great during the drying on the cans.

*Diazo Spots.* This defect may appear as spots or stripes on goods which have been dyed and diazotized in direct sunlight. The diazo compound is thereby decomposed and the developed color appears streaky.

*Streaks.* These may be due to the fact that the goods have been allowed to dry after the diazo bath. By keeping the goods moist, or, best of all, by going through the several operations in close succession this may be avoided.

SIZING.

*Mildew Stains.* These may be due to the use of excessive quantities of weighting and of hygroscopic agents. Among the latter may be mentioned: Magnesium chloride, calcium chloride, glycerol and glucose. The conditions which favor the formation of mildew are a lack of fresh air, an excess of moisture and the presence of cereal products such as starches and flour. Red, yellow, green and brown fungi are the varieties commonly found.

*Reed Stains.* These may appear in cases where a starch-tallow size is used. After the sized yarn has cooled the tallow congeals on the surface and so attracts any particles of matter with which it comes in contact. On passing the reed preliminary to the weaving operation small particles of iron are attracted. In one particular case this caused serious trouble in the dyeing operation.

DYEING.

As might be presumed, the operations in which a color is applied to the yarn or fabric give rise to a large number of defects which may be superinduced by a previous process or which may be due directly to the dyeing operation. It will be necessary, therefore, to consider at this point the several influences which may cause a defect. These may be classed under the following heads: (1) The quality of the raw material. (2) The quality of the chem-

icals. (3) The quality of the dyestuffs. (4) The quality of the water. (5) The process itself; and lastly (6) the machines used in the process.

By raw materials is meant the fibers and yarns. Thus it will be found that "dead cotton" does not absorb the dye as does healthy cotton. Dead cotton is the technical term for such fibers as have not matured or ripened. The astringent juices which fill the cotton cells when they are first formed are changed to neutral and to saccharine compounds by the photo-chemic action of the sunlight. If this process is interfered with, the formation of the cellulose is stopped and the fiber when harvested appears as "dead cotton." "The blue benders cotton" which occurs in commerce is closely related to "tinged" and "stained" cotton. These products are the result of exposure of the plant to rain, wind and storm. The main disadvantage which they possess is that it is impossible to bleach them a perfect white by ordinary methods.

In considering the quality of the chemicals used it will be recalled that muriatic acid containing appreciable quantities of iron is unsuited for use in bleaching; the beta-naphtol used for paranitranilin red should be free from alpho-naphtol; the aluminum mordants used in turkey red dyeing should be free from iron; the anilin oil used in anilin black dyeing should be free from toluidin compounds. These are a few instances in which the impurities contained in chemical materials have a marked effect on the results obtained.

By the quality of dyestuffs is meant the properties which some dyes possess of going on the fiber unevenly unless great precaution be used.

Opposed to these we have a large number of direct dyes which yield even shades in almost every case. The basic dyes, however, belong to the former group. By quality of dyestuffs is also meant the property of some colors to bleed and other to fade and still others to crock when applied to the cotton fiber. The greening of blacks, the reddening of blues and violets as well as the reddening of browns are defects which are due, primarily, to the quality of the dyestuffs.

The quality of the water used will in many instances determine the value of the finished product. Thus the rust spots in the bleach house, the ink spots of the turkey red house, and the crocking of the basic dyes are defects which may be traced to the water used.

After consideration of the minor factors which influence the dyeing process we may turn our attention to the main process. Here we find that the results are influenced, first, by the concentration of the dyebath (compare salt colors and basic dyes); second, the quantity of salt used; third, the temperature of the dyebath; fourth, the care with which the goods have been mordanted; fifth, the care with which the goods have been wetted-out; sixth, the care with which the yarn or fabric has been bleached. This is especially important in the case of pale shades and in the case of goods which are to be dyed with alizarin.

### MACHINERY.

The machines used in textile processes will affect the results in so far as they are not properly cleaned or in the case of drying machinery the goods may be overheated (scorched) at one point. In this connection mention may be made of the

*Singe Spots* which have occasionally arisen in the singeing operation. If the gas is turned on too full or the burners are set too close to the stockings the goods are scorched. The defect appears as streaks or clouds when the goods are dyed in pale shades.

*End Spots.* These have been observed in the case of goods which have been dyed and subsequently crabbed and steamed. If the steaming is not done very carefully, or second steaming is omitted, or the goods have been steamed on vertical rollers, the defect is readily produced. One case, in which a cheviot suiting having a hard twist warp and a loose twist filling, showed distinctly the uneven penetration of the dyestuff was traced back to the steaming process.

*Oil Spots.* Although not due to faulty machinery these spots may be treated of here as they are due to faulty lubrication or to the use of unsuitable lubricants. They are a familiar sight to the bleacher in the stocking mill. After the goods have been bleached they appear as round yellow spots. Neither soda nor bleach have any marked effect on them. The fact that lubricants are in the majority of cases mineral oils or mixtures of these with vegetable oils will explain why these spots can not be removed with soda. The remedy lies in the use of vegetable oils in all cases where there is any danger of flying mineral oil and in machines on which fine tissues are woven.

## THE DEMANDS OF COLOR FASTNESS ON COTTON.

THERE IS NO ABSOLUTELY FAST COLOR. FASTNESS IS AN INDEFINITE TERM. BLEEDING. FASTNESS TO RUBBING AND PERSPIRATION. FASTNESS TO BLEACHING, ALKALIES AND ACIDS.

BY ALFRED BURTON.

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The fastness of colors is dependent upon certain destructive actions arising from causes which exert themselves in different manners. An absolutely fast color does not exist, so that the term "fast" is only to be used in a comparatively limited sense in regard to the degree with which the colors withstand these influences. We speak of fastness to light and atmosphere, to washing and milling, to rubbing and perspiration, to bleaching, to acids and to the alkalies. The dyer should be certain which of these tests are required of him before the selection of a dye, nay, should demand this information, else his reputation falls shattered to the ground and he is condemned in the eye of the public, and then we are told fast colors can not be dyed at home. Let the ambition of a colorist be a reputation for quality, cheapness should be relegated to the man who goes for quantity only.

The production of uniform goods which have to withstand the action of light, air, and oftentimes rain, for the most part of a day, demand a different test for fastness than, say, an expensive silk which perhaps is never exposed to the rays of the sun, but only shows forth its beauty under the benign influences of artificial light, and perhaps is worn very seldom. In the production of carpets and curtains the fastness to light must be the leading test, whilst for knitted goods the choice of a color should depend upon its fastness to washing.

The researches of Chevreul have proven that even the same dyestuff has not the same fastness on all fibers. For instance indigo extract is the fastest when dyed on silk

and the most fugitive on cotton. Vat indigo blue is the fastest on wool and the least so on silk, whilst madder is the fastest on cotton. Therefore, because a dye is fast on any one fiber it is no criterion that it will be equally so on another. It is also phenomenal that saturated dark shades are faster towards light than the same dyestuff dyed in lighter or unsaturated tones. For example, take the superior alizarin colors which have proven to be the most unsuitable for fast light-mode shades. It is also known that some dyestuffs, such as alizarin, madder and cochineal give with all mordants fast colors, whereas young fustic produces with all mordants unstable colors, whilst logwood will give fast colors with some mordants and fugitive ones with others.

With regard to the artificial dyestuffs they may be arranged in groups conforming to their chemical constitution, and one may safely be sure that in accordance with the arrangement of the atoms within the molecule these groups will be productive of fast or loose colors, showing that chemical constitution seems to play a large part in determining the value of a dye, and most dyestuffs produced from a base such as anilin are mostly fugitive, whereas alizarin and its derivatives are mostly fast.

### UNITED ACTION OF LIGHT AND ATMOSPHERE.

The united action of light and atmosphere subdue every color, though some few only after a long lapse of time, noticeable by the gradual fading of the color. Indigo, world famed for fastness, gradually darkens during the first year, then gradually fades away, and it seems a truism that as the sun gives us our beauteous colors, so does it take them away. The dyer possesses no means of strengthening the fastness to light and air, except in the case of a few isolated colors, and yet the color must be more or less fast, especially in such goods as hosiery, underwear, corset covering, linings, etc., and in a much stronger degree in dress goods, awnings, etc. The only way of escape is the proper choice of the dyestuff, and to achieve this end the dyer must have recourse to an exposure test, made somewhat after the following manner:

A dyed sample is half covered with a thick removable paper covering and exposed to the light in the open air, being hung up in a locality where it shall receive the rays of the sun, but at the same time be protected from the weather. At specified times the paper covering is gradually pulled over the exposed portion, say half an inch at a time, until the last half inch is reached, when the gradual fading of the color may be seen at a glance by the removal of the covering and the time noted. For a standard the result may be compared with a sample dyed with indigo blue or turkey red. The samples are observed daily and the day noted when the first change in color is noticeable. In summer it takes usually 12 to 15 days for indigo blue, and 25 to 30 for turkey red; in winter about double this time is necessary. Considerable practice is required in noting the first change which takes place in the color, and it is only after repeated trials that one becomes expert in distinguishing the characteristic changes which take place with the different colors. Thus the fading indigo blue retains its original dull tone, whereas the bright methylene blue becomes duller than paler. The fading action is, therefore, more discernible in the latter than in the former, and readily gives one the opinion that indigo blue is faster to light than methylene blue.

### FASTNESS TO WASHING.

Probably the most important, at all events of paramount importance, is fastness to washing. How often is a muslin or gingham condemned after it has made its re-appearance from the laundry? No longer to be recognized as it once was, the joy of its wearer, though the salesman assured the fair purchaser that it would wash. To meet this requirement the color must withstand both a mechanical friction as well as the action of an alkalin solution under various higher temperatures. Under these conditions the color may not even change its tone, but may bleed and stain other colors woven or printed alongside, especially in the case of white. Such a color alongside would not be considered fast to washing.

Absolute fastness is only shown approximately by a few dyestuffs, such for example, as anilin black by the oxidation process. Any deleterious action in washing is due to the free alkali in the soaps used. Neutral soaps, even the ordinary tallow soap itself, are not generally of much danger, but often the common household laundry soap is a yellow variety (itself a fast color) containing in a large measure free alkali. Ultimately the last portions of the mordant are destroyed, which is the means of binding together fiber and color, thus freeing the fiber of its color. Therefore stronger mordants should be used so that the free alkali present shall have a superfluity of mordant to counteract it, and also such dyestuffs should be chosen, the lakes of which have a greater resistance towards alkalies, as New Blue (Cassella), Indophenin (Baeyer), Catechu, etc.

### BLEEDING.

The bleeding of self-dyed goods, even if the color is not changed, may not be harmful nor displeasing, but it is especially detrimental on mixed fabrics or those containing white. In this case, the active destructive principle is the temperature of the wash-waters. For instance, colors dyed with saffranine will turn bluer and bleed into white in distilled water at 75 degrees C., and still more decidedly at the same temperature in a weak soap solution; but the same color in a much stronger soap solution will not bleed in a temperature of only 30 degrees C. In a similar manner many other coal-tar dyes are affected. It goes, therefore, without saying, that the bleeding in most cases may be prevented by using a wash-water not warmer than 30-35 degrees C. As a matter of fact, household washing of colored goods is done at a much lower temperature than white goods; and so unreliable is guessing at the proper temperature without the use of a thermometer that too great emphasis can not be laid upon the advisability of casting aside such dyestuffs for use in dyeing vari-colored effects, whose lakes bleed easily under these conditions.

Natural and mineral dyes never bleed, also several analin dyes, especially when dyed in full tones. Decidedly unacceptable in this case are most benzidin dyes with the exception of the diazotised diamine colors. Most benzidin dyes bleed even in light shades, in weak alkaline solutions only slightly warmed, and repeated washing in water does not seem to eradicate this fault. White and other colors woven together take up speedily the color as it bleeds off. However, benzidin dyes show a characteristic fastness in another direction possessed by no other dyes, turkey red not excepted, in that after repeated washing and bleeding the brightness and depth of the shades seem hardly to be impaired. For self-colored wash-goods these dyes are

very advantageous, also for fancy goods where the other dyed fiber is wool, as by severe washing the wool does not take up the color that bleeds off.

RUBBING AND PERSPIRATION.

As regards fastness to fulling, an article such as this would be of very little moment as the cotton fiber does not lend itself to this process and would only be required to resist this influence where it is used as an effect thread in woolen goods. Therefore we will pass over to the more important demands of the trade—fastness against rubbing and perspiration. This requirement is of utmost importance in the production of hosiery and knit-goods, yarns, and correct coverings and linings, and should be taken seriously into account for goods used by the making-up trade in the manufacture of underskirts. The color should not rub off nor soil light-colored or white underwear, or come off on the hands or gloves of the wearer. As a remedy, precautionary methods are taken partly by means of the addition of a sizing material to the dye-bath or printing paste which is dried upon the fiber and in a mechanical manner causes any loose color to adhere to the fabric, in part by a final passage through a tannin bath, whereby the dye forming the color lake in the under layers of the fiber is fixed in a chemical manner, and also by soaping the goods after washing, and in this way removing any loose or uncombined dye from the face of the material. Still any or all of these operations do not always give satisfactory results; the color will rub in spite of all, the color-lake has not penetrated the fiber sufficiently deep and has only fixed itself mostly upon the surface. The cause of the rubbing, therefore, is not on account of the dyeing process, but in the behavior of the dyestuff to the fiber.

Cotton possesses divers attractions for the absorption of lakes, and only such dyes for which the fiber has an attraction will produce results fast enough for rubbing. Indigo, for instance, which is squeezed from the fiber, and on that account always rubs, is exactly different from the benzidines which will not rub of themselves. Further such colors as methyl violet, magenta, and saffranin rub badly, whereas Saffranin S, Methylene Blue, Methylene Violet (Hoeschst), New Blue (Cassella), Indophenin (Baeyer), and such like are satisfactory towards rubbing. The proof consists in rubbing with the hand on white paper not too smooth, or better still, with an unsized cotton rag.

Fastness to perspiration is often demanded besides fastness to rubbing, more especially with goods that come in contact with the skin and absorb, or take up, the secretions thereof. Perspiration is composed almost wholly of water and traces of several acids, such as butyric, acetic, and formic, and also phosphoric acid salts. The action of these bodies is exerted through the influence of the heat of the body and friction, and above all none the less aggravated by the concentration on the fiber of the perspiration with all its ingredients, through the continual drying out of the perspiration, which in time becomes even detrimental to the fiber itself. The best test is to wear under the arm or sole of the foot, the sample to be tried, or, for a laboratory trial make a weak acetic acid bath with distilled water and acetic acid of 30 per cent., heat to about 37 degrees C., the approximate temperature of the body, dip the sample therein and rub it with the hands for a minute or two, then, without washing, allow to dry at the ordinary temperature, and also between two pieces of parchment at 25 to 30 degrees C. This is repeated several times, and the more often it is done the nearer to the true thing does it come.

BLEACHING.

Another requisite demand for color fastness in cotton goods is towards chlorine or bleaching. This is necessary where the goods are to be bleached after dyeing for the purpose of bringing out undyed parts of the fabric in a cleaner white. The operations, as are well known, are boiling under pressure, after treatment with chloride of lime, muriatic acid and soap. The boiling in water for such colors as are not destroyed in hot water, or for which the fiber has more or less attraction is not detrimental, in fact, is rather advantageous, because the steaming tends to complete the combination between fiber and color.

Chloride of lime is very energetic in its destructive action on both natural and artificial dyestuffs alike, while dilute muriatic acid is of very little account in attacking colors which are fast to chemicking. It, on the contrary, is more energetic in its action on colors destroyed by bleaching, causing them to entirely disappear. The only influence of soap is, practically, in rendering the fiber more pliant and agreeable in handling. Colors fast to chloring are the colors produced by the oxide of iron, red liquor, and the like, in combination with alizarin.

To test colors for their fastness towards bleaching, it is best to boil first, as many vat blues and turkey reds are topped with direct dyes. If bleeding takes place it proves the presence of benzidin dyes. Afterwards place the sample to be tested in a cold, clear solution of chloride of lime, about two degrees Beaume, for 1 to 1½ hours, wash well and pass through a weak sour, wash again and dry. Any color standing this treatment may safely be used for fancy woven effects which require bleaching afterwards.

The fastness to acids and sulphuring is, also, like fastness to milling, rarely demanded of the cotton goods dyer. It is more essential when turkey red or indigo blue is used for a fine cotton thread effect in all-wool goods with cream or white grounds that require a final sulphur bleach. So the general cotton dyer need not apply himself to this, unless he is producing goods afterwards to be handled by the rubber manufacturer.

SELECTION OF DYES.

It goes, therefore, without saying that the selection of dyes is of the utmost importance, and that too much time and attention can not be bestowed upon such an important choice. As a basis for a comprehensive plan to meet the demands of most cases the following tables will be found useful. It is known that fastness to washing is seldom found in combination with equal fastness to light and rubbing, so that the most important points should be taken into account first.

1. The demand of color fastness for hosiery and knit goods: (a) fastness to rubbing; (b) fastness to washing; (c) fastness to light.

2. The demands for yarns for wash goods: (a) fastness to washing; (b) fastness to light; (c) fastness to rubbing.

3. The demands for yarns for wearing apparel not requiring to be washed: (a) fastness to light; (b) fastness to rubbing; (c) fastness to washing (in so far as to withstand the finishing process).

4. The demands for curtains, covers, carpets, fringes, etc.; (a) fastness to light; (b) fastness to rubbing.

## THEORY OF DYEING.

Dyeing Is Still an Empirical Art. Theories Can Be Classed Under Three Heads. Chemical and Mechanical Action. No One Theory Will Explain All Results. Diffusion in Dyeing. Dialysis. Osmose.

Although much time and labor have been devoted to the study of dyeing processes from the point of view of discovering what are the chemical and physical laws which underlie them, the chief tangible result has been the consumption of large quantities of paper and ink in the shape of bulky manuscripts contributed either to the journals of the color trades or to their wastepaper basket.

Dyeing is still, in the eighth year of the twentieth century, a purely empirical art to all practical intents and purposes, even more so than medicine. The same may be said of dye manufacture. Were there solid chemical foundations for this vast industry we should not see such huge numbers of new dyes daily put upon the market, most of which prove useless although they are patented at great expense all over the civilized world on the off-chance that they may turn out well. The expenditure of the dye-making firms on chemical laboratories and the takings of the various patent offices would soon show considerable diminution.

Nevertheless this branch of research has been by no means abortive. As is always the case in search after truth valuable information which was not sought has been acquired, and what has already been achieved will help future workers by showing the paths that have been followed without success.

Dyeing theories can be classed under three heads. The first and the oldest theory, that of Hellot in 1734, is that the result is achieved by purely mechanical methods. It was argued that the textile fiber was covered with dye just as canvas is painted in oil or water colors by an artist, but with this difference, that the originator of the theory as well as his supporters of later date, admitted that the dye might penetrate the cells of the fabric, and therefore not depend on mechanical adhesion alone as regards fastness to exterior agencies. The second is that there is an actual chemical combination between the fiber and the dye, or at least between the fiber and the lake formed by the action of a mordant. The third is the vague absorption or solid solution theory which supposes some action of an osmotic nature between the cell-wall of the fiber and the dye, an action which removes the coloring matter from the influence of outside agencies so far as the cellulose or other essential constituent of the textile material can effect.

It is not difficult to see that one-sided ideas of this character must lead to error. What is the use, for instance, of making experiments with soluble dyes and animal charcoal or china clay and arguing from their results as to the action which happens where these dyes are applied to organic fibers, whether animal or vegetable? It must be evident that no research on these lines can lead to any result useful for textile dyeing. When too, we consider the great variety both of dyes and of textile materials both in view of different and highly complex chemical composition and of greatly varying physical structure it ought to be clear that no one theory will explain all the results.

The originator of the second or chemical theory is Bergmann, who published in 1776 an article showing that whereas sulphindigotic acid was greedily absorbed by wool it had very little dyeing effect upon silk. He considered that the difference in effect depended entirely on wool fiber having a much greater affinity for the acid than silk. A contemporary of his, the famous Macquer, seems to be the first who recognized that both chemical and physical phenomena might be associated in dyeing. He was at first an ardent disciple of Hellot, but two years after the appearance of the article by Bergmann he draws a distinction between the dyeing capacity of fibers of different chemical composition, and puts them in the following order as regards their receptivity for dyes—wool, silk, vegetable fibers. He regarded the dyeing process as partly chemical and partly mechanical. Berthollet in 1791 frankly embraces Bergmann's theory as a sufficient explanation, and practically discards the mechanical theory altogether.

Bancroft, the first English writer on dyeing theories, had studied the works of all his predecessors, from Hellot downwards. He was the first to classify dyes as substantive and adjective, or at least the first to use these particular terms. He was on the whole, an adherent of the chemical theory, but it is important to note that he attributes certain dyeing effects to optical properties quite distinct from selective reflection.

Chevreul dealt thoroughly with the subject in his eighth memoir published in 1834. It must not be forgotten that these early investigators knew nothing about the coal-tar colors. He follows Macquer for the most part, but he may also be regarded as the originator of the third theory, as he studied the effects upon many dyeing processes of dialysis, capillarity and other phenomena. These phenomena were obscure in his day, and we know little more about them than he did. It is not surprising therefore, that they led him to no decisive result. He regarded even a solution in water as a sort of chemical compound and opined that a fabric could not get the dye out of the water without some chemical affinity for it, although this affinity is no doubt slight, and is backed up by mechanical and other actions. When once the dye is inside the fiber, the mechanical protection of it afforded by the cell walls must be a factor in the fastness of the dyeing, for the osmotic action will then be rather inwards than outwards, so that it will in no way promote the escape of the imprisoned dyestuff.

Walter Crum originated the researches with inorganic bodies and charcoal. In an article of his on cotton dyeing published in 1843, he pronounced strongly against the chemical theory and ascribes the effect of porosity and absorption, to what is vaguely known as capillary attraction in short. J. B. Schlossberger, just in the infancy of the coal-tar colors in 1857, recognized the complication of the dye-theory question introduced by their discovery, although he had, of course, no conception of the enormous extension which was in store for them. He made one curious mistake which is typical of the erroneous reasoning of all having a predisposition to a one-sided theory. He considered the fact that wool and cotton retain their structure after dyeing as a proof that there can be no chemical combination between the textile and the dye, not knowing or forgetting that it frequently occurs that chemical composition may be totally changed, and yet organic structure may be retained even in its most microscopic details. Every palæontologist

knows how common such an occurrence is in fossils. A pseudomorphic fossil may be exactly like the original plant or animal in structure without retaining one atom of the original materials of the body.

To Mueller-Jacobs, in 1884 and 1885, belongs the credit of the first full consideration of the part played by diffusion in dyeing. His researches on turkey red impressed him with certain analogies between diffusion through membranes, i. e., dialysis, and the phenomena accompanying the fixation of dyes upon vegetable fibers. He points out that some dyes can osmose into a cell, but can not osmose out of it again. This must be regarded as a most important contribution to the store of facts requisite for dye-theory building. The direction in which osmosis takes place depends on the chemical composition of the gases or liquids on either side of the diaphragm, among other things. Hence it is quite understandable that in the dyebath the osmosis should generally take one direction, but if the direction can not be reversed by altering the composition of the outer liquid, as is done, for example, when a dyed fabric is washed, we have obviously a fact which must deserve serious study.

Mueller-Jacobs is inclined to explain the phenomenon by supposing that the diffusion pores of the membrane become choked in the dyeing process, whereby osmosis both ways is finally prevented. Some well-known facts in vegetable physiology lend considerable support to this hypothesis, especially the fact that old cells, with walls which have thickened in the natural course of old age, are more difficult to stain than younger cells in the same tissue. This is a fact of which every microscopist is well aware. At the same time there are obvious objections to the choking hypothesis. It may be correct in some cases and not in others. If, for example, the dye liquor formed insoluble compounds with bodies it met with in the substance of the cell-wall itself, rapid choking of the pores would no doubt ensue. Some work has been done in comparing the dialysing powers of certain dyes, but much more remains to do. One thing is certain. The coal-tar colors comprise dyes of every possible degree of dialysing power. Perhaps Congo Red and Chrysoidine represent nearly two extremes, want of general osmotic power in the case of the first and great general osmotic power in the case of the second.

The discovery of the coal-tar colors has of course had an enormous effect upon the theorizing. It has multiplied the number of dyes in use, to say nothing of the number known, by many hundreds, so that the dye list is now as big as once it was small. Nevertheless the three theories still exist, although only few would now contend that they are antagonistic and mutually exclusive. When we find for example a dye of highly complex chemical composition which will dye wool but not cotton, or cotton but not wool, under as far as can be ascertained absolutely identical conditions of texture of the material, temperature, length of bath, duration of the dyeing process, and what not, it seems very difficult to explain the difference in effect without appealing to differences in chemical affinity, although differences in osmotic phenomena may not be without their effect.

As regards the future of these researches, it seems clear that the investigators must make up their minds to consider the question from every possible point of view, whether chemical or physical or chemico-physical, or physico-chemical. Of late years, the artificial boundaries between chemistry and physics have developed a vagueness which would at one time have been thought impossible, thanks chiefly to the study of the various forms of radio-activity. Having made up his mind to this, the investigator of dyeing theories, will have a better chance of success, for he will recognize the extreme difficulties of his work. He must accumulate a far greater stock of experimental facts than has as yet been acquired. It is not enough to study the action of a dye upon, say, first wool and then cotton. The action of each dye on each fiber must be tried under as great a variety of conditions as possible for one thing. For another, some serious attempt must be made to obtain more accurate knowledge of the chemical composition of the various textile fibers. The effect on the osmotic phenomena which is produced by the multifarious manufacturing processes must also be separately studied.—*Herbert Robson in Dyer and Calico Printer.*

## WHEN GOODS ARE DAMAGED IN THE PROCESS OF DYEING.

The following query was sent to the *Journal of Commerce,* New York, for a reply:

A converter sent gray goods to a finisher to be dyed and delivered at a time fixed. They were ruined in the process of dyeing. The converter claims that he is entitled to have, as damages, the value of the gray goods and all of his profit. The dyer claims that he should have only the value of the gray goods, because that is all that was, or could have been lost when the goods were destroyed. Please say which is correct.

The following was the reply: If the dyer had done his work properly in this case the owner of the goods could have taken them into the market on the day he received them from the dyer's hands and could have sold them there at the prices then prevailing for goods of that kind. Now, the owner of the goods is entitled to be placed in as good a position as he would have been in if the dyer had done his work properly; he is not to lose anything as a result of the dyer's carelessness. The only way to place him in this position is to give him a claim against the dyer for the difference between the value of the goods as they were returned to him, if they had any value at all then, and the amount they would have brought if properly dyed; out of this is to come the value of the dyer's work. The damages thus ascertained are the least the courts will, ordinarily, ask the owner of the goods to accept.

If the owner has sold the goods beforehand, to be dyed before delivery, he can not recover of the dyer more than the price for which he had sold the goods; in that case he could not have sold them, if they had been properly dyed, at the prevailing market rates, but he would have been legally obliged to deliver them at the price for which they had been sold in advance.

If the goods have been sold beforehand at a price which turns out to be higher than the market price at the time of delivery, he may, in special cases, be allowed to recover this higher price. This will be allowed only in case the dyer knew that such a sale had been made and that these goods were being dyed for delivery on that contract.

The reason of the rule is this: That if the result of a mistake is to be more costly than usual the dyer has a right to know that fact beforehand, so that he may use special care in the matter, may charge an extra price to cover the extra risk, if he choose to do so, or may decline the

work altogether if this seems best. With no knowledge of a sale at a specially good price, the dyer has a right to assume that the only result of his spoiling the goods will be an obligation on his part to pay the market value of the finished goods which the owner had a right to expect from his hands.

These are the rules adopted and enforced by the highest court in this State. Thus in 101 N. Y. 631, the Court of Appeals held that when goods had been damaged in a dyeing establishment, the measure of damages must be "the difference at the date of delivery of the dyed buntings between their market value and the market value of the same goods skilfully and properly dyed." Here the goods had been sold for future delivery, but only at the market rate prevailing when the time of delivery arrived, and the selling price was allowed to be put in evidence to establish the market rate.

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### GIVE THE DYE HOUSE LIGHT.

One of the leading factors in the industry recently advanced the opinion that in the erection of mills in the future more consideration would be given to the location of the dyeing department than has been done in the past.

The experiences of the present season have without doubt convinced many a manufacturer that while the light afforded by the present location of their dye houses may be good enough for the production of fabrics of the colors of the past, they do not furnish the requisite light for the delicate shades in vogue to-day.

It is pointed out that evidently the only point considered in locating a dye house has been to see that it was as near as possible to a stream of water and it did not matter after if high buildings were erected around it that excluded 75 per cent. of the light needed. The exigencies of the present season have forced several local manufacturers to make alterations in their dye houses looking toward the end of better light. In one instance a new dye house has been built, in which one of the prominent features is a large plate glass window for the dyer's use.

Manufacturers are realizing that the better light furnished for the weaving and spinning the better and more profitable the work will be, and if this is true in the case of the making of the fabric it will surely be more true in the finishing of it. Errors in spinning and weaving may be corrected in the sewing and burling room, but errors in dyeing, particularly to-day, are often beyond correction and entail a loss of many dollars. Says another party: "Give the dye house a chance, give it the food that it craves—plenty of light, and it will amply repay you."

# WOOL MANUFACTURING.

### THE DYEING OF CARBONIZED SHODDY.

BY A PRACTICAL SHODDY DYER.

The very great importance of shoddy as a raw material for a wide range of fabrics gives it a somewhat prominent position, and on account of its origin and general properties, it is closely related to wool in so far as its technical treatment is concerned. There are, however, certain conditions in its intended use which must be met and overcome before satisfactory final results are secured and the most important are those preparatory to dyeing.

Shoddy, generally considered, is recovered wool from various sources, some grades being obtained from previously worn clothing. In its raw state, it varies in color from white, through numerous multi-colored mixtures, to dark blues and blacks. Consequently, before it is practical to utilize it in the manufacture of cloth, it is necessary to treat it in such a way as to have it clean and free from any remains of sewing threads and fibers other than wool, which, if not suitably and completely destroyed, will not only cause specks to appear in the finished goods, but other difficulties as well.

The process of removing the remains of vegetable fibers, etc., from shoddy is termed carbonizing, and is best illustrated by the most commonly employed method, which consists of saturating the rags for shoddy with a dilute solution of sulphuric or hydrochloric acid, and drying in an oven, the result being that the vegetable fibers are converted into a powdery mass, which is then removed from the now "carbonized stock" by dusting.

Various other processes are in use to accomplish the same result, but all are based upon the same principle, that of the well-known destructive action of mineral acids upon vegetable matter, without seriously affecting the quality or altering the general properties of the wool.

While success is the general rule in using such carbonized stock in the manufacture of fabrics, there are times when difficulty is encountered during dyeing, the dyer noting that the colors are not going on evenly, and even in some instances no color being taken up at all. If we look carefully into the entire subject of shoddy treatment, we must realize that the original stock from which the shoddy is made has been in previous use and consequently has taken up, by contact and wear, grease of various kinds, which, when it is subjected to the acid carbonizing process and then to the influence of heat, is all the more firmly fixed upon the fibers, thus acting as a resist to the dyestuffs in solution in the dyebath.

In such a case, in fact, wherever this process is used, the carbonized rags should always be given a thorough washing in warm water and without soap, in order to ensure the removal of the excess of acid remaining in the material. This may also be facilitated by the cautious use of a weak solution of soda crystals, which neutralizes the remaining traces of acid, and which should always be followed by a light washing before further treatment.

Another serious difficulty often met with in the handling of carbonized stock is that caused by excessive heating during the drying, which very naturally alters the dyeing properties of the fibers; destroying their "life" without actually destroying their substance. Excessive heating appears to give such wool the general properties of kemps, which are extremely difficult to dye. Consequently the difficulties which the shoddy dyer most frequently meets may be traced to two chief causes, excess of mineral acid or grease in the material, or the effect of over-heating, or too prolonged drying. If the material is well washed to free it from all foreign matter before soaking in the carbonizing solution, then well washed after the dry-

ing, there is no doubt but that the uneven shades usually obtained will occur no longer.

The actual dyeing of shoddy does not materially differ from wool dyeing, and the same general groups of dyes applicable to one are applicable to the other, and the same precautions in applying them should also be employed.

The dyeing process for the following combinations of dyestuffs is, briefly, to apply the colors from a bath charged with 10 to 20 per cent. glauber's salt (crystals).

Enter the stock at from 120 to 175 degrees F., (the lower the temperature of immersion the greater probability of more thorough penetration and consequently more level shades), raise to the boil, and boil for one hour. Allow to cool and add the indicated quantity of bichromate of potash and continue at the boil for an additional one-half to one hour. Lift, drain, wash and dry.

The following quantities are for 100 pound batches of carbonized shoddy and the amount of bichrome indicated below the line under the formula is that required to be added to the exhausted dyebath.

DARK MAROON.

3 lbs. Anthracene Chrome Red A
2 lbs. Bichromate of potash

DARK BLUE.

1 lb. Anthracene Chrome Blue B Pat.
9 1-2 ozs. Formyl Violet S 4 B Pat.
8 ozs. Brilliant Milling Green B
1 1-4 lbs. Bichromate of potash

BROWN.

3 lbs. Anthracene Chrome Brown D
2 lbs. Bichromate of potash

REDDISH GRAY.

2 1-4 ozs. Anthracene Acid Black S R Pat.
350 grains Brilliant Milling Green B
3 1-4 ozs. Bichromate of potash

MEDIUM GREENISH RED.

6 1-4 ozs. Anthracene Chrome Blue B Pat.
2 1-4 " Brilliant Milling Green B
1 1-2 " Anthracene Yellow B N
8 ozs. Bichromate of potash

DARK GREEN.

8 ozs. Anthracene Chrome Blue R Pat.
9 1-2 ozs. " Yellow B N
9 1-2 ozs. Brilliant Milling Green B
1 lb. Bichromate of potash

OLIVE.

2 lbs. Anthracene Yellow B N
1 " " Chrome Blue B Pat.
2 lbs. Bichromate of potash

DARK BROWN.

3 lbs. Anthracene Chrome Brown D
2 lbs. Bichromate of potash

BLACK.

5 lbs. Anthracene Chrome Black F
2 1-2 lbs. Bichromate of potash

## WOOL MANUFACTURING IN FRANCE.

Both woolen and worsted yarns are, of course, made of wool, the main difference being that the former is put through as few processes as possible—usually only carding and mule spinning—so that the yarn more resembles the original material, with short unparalleled fibers projecting in all directions; while the worsted yarns go through more processes and the long fibers only are retained and these are paralleled and smoothed out straight. The woolen cloth from the first has usually a fuzzy appearance and this is in many cases increased by napping, especially for blankets, so as to entirely hide the structure of the cloth. Worsteds are usually not napped at all or only slightly, as it is important to shown the design.

PREPARATION OF THE WOOL.

For both classes the wool as it comes from the sheep is sorted and then washed to remove the natural grease, perspiration, and dirt which, together, make up one half to two thirds of its gross weight. It is usually shaken in a machine called a willey to remove the loose dirt before undergoing this process. After washing there still remain burrs and other extraneous matters embedded in the fibers. In olden times these were removed by hand or by a rough burring machine consisting of wire-covered beaters.

CARBONIZING.

Then a process of carbonization with acids was introduced by which the vegetable matters were burned out. If not very carefully done this deprives the wool of its "nature" and renders it brittle and hard to work up into manufactures where "live wool" is required. There have therefore been new inventions to do away with the sulphuric acid bath and to use only mechanical means again. One such method known as the "Youla non-chemical system" is increasing in use in France and is much favored by the manufacturers.

After being washed, cleaned, and dried wholly or partially, the wool is oiled with olive oil, or a cheaper substitute to make it supple and is then ready for manufacture.

WOOL AND WORSTED PROCESSES.

For woolen yarn or for worsted yarn from short wool the first process is carding; for worsted yarn from long wool it is "preparing." The woolen and worsted cards are essential in their main work and consist of "sets" of cards (two or three cards arranged together tandem, the first being called the scribbler and the last the carder), each made up of wire-covered cylinders against the upper surfaces of which operate pairs of small "working" and "stripping" rollers instead of the top flats as used on cotton cards. The take-off arrangement of the woolen and worsted cards are different. In the first the material is stripped from the cylinder by two doffers carrying alternate rings of card clothing and smooth leather, the card clothing rings of one working in the line of the smooth leather rings of the other, so that the two doffers together strip the cylinder completely. These doffers in turn are stripped of their ribbons of wool which pass between broad leather belts which work from side to side with an action like that of the hands and roll each ribbon up into a sliver. These wind up side by side in cheeses on a beam, which then goes to the mule. In the worsted card the web comes off in one sheet and is condensed into a single sliver like that of a cotton card, but instead of winding into a can it is rolled upon into flat-ended balls by an automatic balling attachment.

THE WORSTED PROCESS.

For worsted yarns to be made from long wool, where in some cases the fibers are twelve inches or more in length, the card can not be used on account of the danger of breaking the fiber. The material is "prepared" by being passed through six sets of graduated "gill boxes" which are practically draw frames with combs or "fallers" working between the back and front rollers.

The worsted slivers as made by either process are then put through a "backwashing machine" to eliminate the oil and remaining dirt. In this machine they are run through

bowls of suds, between squeezing rollers and over drying cans. They are then oiled again and put through two more gill boxes. They then go to the combs which are always steam heated; here the tops are separated from the noils and waste. Only the tops are used in worsted manufacture and the slivers of these, after the combing operation, are again backwashed, put through two gill boxes and rolled up into balls again. This completes the work of making "tops."

These tops are kept as balls for a while in a conditioning chamber so as to preserve the straightness that has been imparted to the fibers and also to bring them to the proper condition. Cotton yarns are supposed to contain 8½ per cent. moisture and silk yarns 11 per cent. moisture, but worsted yarns to work well should contain between 15 and 16 per cent.

Before spinning the tops are put through drawing processes of gill boxes and roving boxes and wound on bobbins for use in the spinning room.

ESSENTIAL DIFFERENCE BETWEEN ENGLISH AND FRENCH SYSTEMS.

The foregoing are the general processes used in making yarns from wool, and we will now notice how the French system differs from the English system. It may be noted that it is largely due to the difference in the mechanical systems employed that England excels in the production of worsteds for men's wear, such as tweeds, coatings, trouserings, etc., while France excels in the production of women's dress materials, especially of soft and nicely draping material for skirts, etc., and of draperies in general.

The essential difference of the two systems is that the French, besides using the mule where the English use the ring frame in making worsted yarn, send the material to the mule with scarcely any twist in it at all, while the English send the material to the ring frame with some twist already inserted. In other words, the English worsted ring spindle uses roving and the French mule spindle uses sliver, according to the accepted definition of these terms.

In England the tops, after storing and conditioning, are put through gill boxes and then through roving boxes and wound on the bobbins of vertical spindles by means of flyers. The rotation of the flyer inserts sufficient twist to enable the roving to stand the strain on the ring spinning frame. In the French system the top slivers go through the gill boxes as above, but there are no roving boxes. For them there is substituted a machine, the "bobbinoir," in which the slivers in passing from the back set of rollers to the front are supported by a porcupine cylinder and are then wound onto horizontal bobbins. No twist at all is inserted, except that rubbing leathers like those of a woolen card are employed to give firmness to the slivers to stand the slight strain put on them by the mule.

The worsted sliver in the French system therefore goes to the mule in the same form as the woolen sliver, though, of course, the fibers are longer and more cleaned and paralleled. The difference between the English and the French system is important, and as the French system puts so much less strain on the yarn they can spin relatively short fibers to much higher counts than possible in the other system. The yarns so made are softer and have a different feel from those made on the English plan and give entirely different qualities to the goods made therefrom.

COMBING VARIATIONS—MILL ORGANIZATIONS.

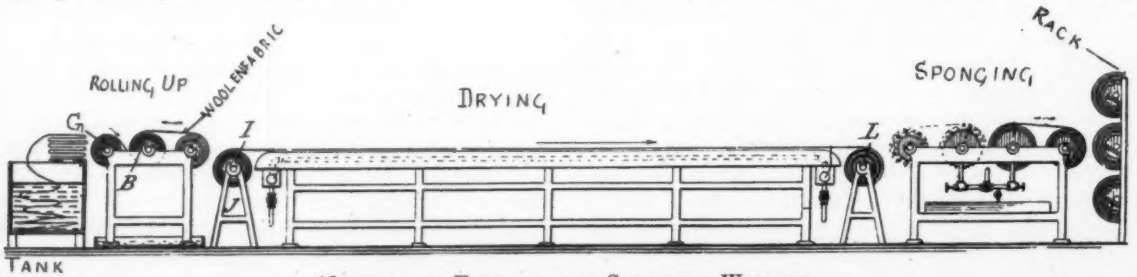
In England also, while the Heilmann comber is largely used for cotton, the Noble comber is ordinarily used for worsteds. In France all makes of combs are employed—the Lister or nip combs (for long wools only), the square motion Holden combs (mainly in factories of the Holden name), the Noble, the Offerman, etc., but the bulk are mainly of the Heilmann type, as this is especially suited for the French work and for short staples. Much of the French combing is also "dry"; that is to say, oil is not used at all to limber up the fibers, or else only in small quantities such as can be entirely washed out of the tops after combing and before the final gilling. The French also have special methods of dyeing and finishing, which are too technical to describe here.—*Special Agent W. A. G. Clark's Report to U. S. Government.*

## SHRINKING AND FINISHING WOOLENS.

The object of the apparatus herewith illustrated is to provide a method for shrinking and finishing woolens and similar textile fabrics in a quick, simple and comparatively inexpensive manner, at the same time producing fine and permanent finish, without danger of disturbing the color in case the dye used is not absolutely fast, the finish being free of creases or other undesirable marks.

The method consists essentially in rolling up a roll of a dry woolen fabric with a roll of a wet dampening sheet, to moisten the woolen fabric by moisture from the wet sheet; then unrolling the fabric and the dampening sheet and passing the same in opposite directions and rerolling the same, then unrolling the woolen fabric and passing it in open width onto a heated surface, with the face of the fabric in contact with the heated surface, to dry the fabric and to set the face fibers, and finally sponging the dry fabric.

The apparatus consists essentially of a saturating tank, a rolling-up device, a drying apparatus, a sponging device, and a rack. The tank is filled with water in which a dampening sheet, preferably of cotton, is immersed in open width, and when properly saturated, is lifted up, fold by fold, and placed on draining slats arranged on the top




Machine for Finishing and Shrinking Woolens.

of the tank, to allow the surplus water to drain back into the tank. The dampening sheet is now rolled up on a roller adapted to be placed in suitable bearings arranged on one end of the frame. The woolen fabric to be shrunken is first opened out in a loose pile in open width, and is then rolled up on a roller arranged on the front end of the frame. On a roller both the woolen fabric and the dampening sheet are rolled up together in alternate layers, so that the moisture contained in the dampening sheet passes by capillary attraction into the layers of the dry woolen fabric, to uniformly and thoroughly moisten the woolen fabric. Any water that may drip off from the rolled up sheet and fabric falls into a drip-pan. When this has been done the woolen fabric and the dampening sheet are unrolled from the roller B and re-rolled on the rollers I and G, respectively. The dampening sheet can then be re-used by first unrolling it from the roller G and returning it to the tank for re-saturation.

The roller I, with the moistened woolen fabric rolled up thereon, is now transferred to a stand J arranged adjacent to one end of the heated surface of the drying apparatus. The heating surface is in the form of a long shell of copper or like material, and rounded off at the ends, and underneath the heating surface is arranged a heating device in the form of steam pipes.

A portion of the woolen fabric corresponding to about the length of the heating surface is now unrolled from the roller I and is passed over the heating surface in the direction of the length thereof and with the face of the fabric downward and in contact with the heating surface. This extended portion of the fabric is now left in contact with the heating surface until the portion is sufficiently dry and in proper condition for the subsequent shrinking process.

The dried portion of the fabric is now rolled up on a roller L. By this operation another wet portion of the woolen fabric is passed over the heating surface, to be dried in the same manner as the first portion, and then this second dried portion is rolled up on the roller L. This operation is repeated until the entire piece of the fabric has been dried and wound up on the roller L. The roller L with the dried fabric rolled up thereon is now transferred from its stand to one end of the sponging device, which consists essentially of steam cylinders.

After the cloth has been subjected to the action of the dry steam in the cylinders, the cloth is wound up on the roller, which is then transferred to the rack. The roller with the fabric thereon is left on the rack a sufficient length of time to properly dry, cool and re-finish. When the cloth is properly finished, it is ready to be measured, cut, or re-rolled.

# MARKET REVIEWS.

## KNIT GOODS MARKET.

The market is more or less irregular, there being good demand for some classes of goods, while there is extreme dullness in others. Fleece-lined goods are in demand the same as has been for several months past, giving the mills that are employed in their production sufficient orders to keep their machinery in operation for several months ahead. Early deliveries are almost impossible.

Reputation is a factor of evident importance in the trade at the present time, and those mills that have been particular in past seasons in the manufacture of their fabrics are now reaping the advantage of their good name, as their goods are invariably given preference over those which have been depreciated in quality in order to meet prices. It does not pay to sacrifice quality to price at any time.

Buyers are more or less influenced in their purchases by the terms that they are able to secure, and credit oftentimes determines the size of the order that may be placed. There is considerable looking around for the purpose of ascertaining the status of trade regarding the advisability of making purchases for any trade that may be anticipated. Jobbers and manufacturers' agents are sending men out into the country to feel the pulse of local markets, even if no orders are placed. The disposition seems to be to postpone buying until after the presidential election, as this event is consuming the attention and thoughts of the people and working upon their sentiments. It is admitted that a great scarcity of goods would develop in the country districts should anything near a normal demand arise.

We have a number of reports showing mills going on full time, and in one or two instances overtime is reported. There are many evidences of an improved tone in business conditions. For example, nearly all of the mills about Utica, N. Y., are being operated to their normal capacity. Many of the mills in the Mohawk Valley are receiving duplicate orders for spring goods, mostly underwear. Though there is a general improvement among the mills, buyers are ordering cautiously. Collections are reported to be better than they have been for a number of months past.

## THE COTTON YARN MARKET.

The prices given herewith are those upon which sales have been made and in some instances they are a trifle higher than the goods can actually be purchased for. For instance a large buyer has placed his order for 9's to 12's on a basis of 15 cents.

On single skeins the market is dull and very little business is being done, and in some instances yarns can be bought at lower prices than those quoted. For Southern two-ply yarns the prices vary and in some instances 8-3 ply on cones have been sold as low as 14 cents. This sale was made not only through a commission house, but also one of the mills quoted direct this price and also the same price for 10-3 ply on tubes. Sales on 10-3 ply have been made within the last two or three days at 14½ cents, and 16-2 ply can be freely obtained from stock at 15½ cents. For Southern single warps some mills are asking one-half cent higher than the quotation mentioned. On the other hand the buyer can obtain yarn at lower values.

On frame hosiery yarn the market has been very dull, but there is more business being placed at low values. Where values are very low, the buyers are inclined to purchase ahead. On the other hand, the mills are not anxious

to sell for months ahead on prices which barely get them out whole or just cover cost.

The market for all kinds of yarn is broadening and the stocks on hand are being rapidly consumed. There has been more or less business during the past three or four weeks, what might be termed an accumulation of orders. The manufacturers have been receiving orders in very small lots, not large enough to warrant their covering any one of them and they held them back until they have sufficient business to warrant their placing orders ahead.

The attempt of the speculators to boom cotton at the expense of cotton manufacturers, we fear is going to cause a re-action later, as the trade is not inclined to anticipate wants at present prices, and if prices advance manufacturers will probably continue to buy more conservatively. The only people who are willing to contract ahead are those who are making offers at prices which the mills can rarely entertain. There is a good demand for spot goods.

We quote:

SOUTHERN SINGLE SKEINS.

| | | | |
|---|---|---|---|
| 4s to 8s | 14@14¼ | 22s | 16 |
| 10s to 12s | 14½@15 | 26s | 17½ |
| 14s to 16s | 15 @15½ | 30s | 19 |
| 20s | 16 | | |

SOUTHERN TWO-PLY SKEINS.

| | | | |
|---|---|---|---|
| 4s to 8s | 14½ | 30s | 19@19½ |
| 10s to 12s | 15@15½ | 36s | 22@24 |
| 14s | 15½ | 40s | 23@25 |
| 16s | 15½@16 | 50s | 30 |
| 20s | 16½@17 | 60s | 38 |
| 24s | 17 @17½ | 3-ply 8s upholstery | 15 |
| 26s | 18 | 4-ply 9s upholstery | 15 |

SOUTHERN SINGLE WARPS.

| | | | |
|---|---|---|---|
| 8s to 10s | 14½@15 | 22s | 16@17 |
| 12s | 15 @15½ | 26s | 17½ |
| 14s | 15½@16 | 30s | 18½@19 |
| 16s | 15¾@16 | 40s | 22@24 |
| 20s | 16 @16½ | | |

SOUTHERN TWO-PLY WARPS, ETC.

| | | | |
|---|---|---|---|
| 8s to 10s | | 26s | 17¾@18 |
| 12s to 14s | | 30s | 19@19½ |
| 16s | 15½@16 | 40s | 23@24 |
| 20s | 16 @17 | 50s | 30 |
| 24s | 17½ | | |

SOUTHERN FRAME PEELER CONES.

| | | | |
|---|---|---|---|
| 8s | | 20s | 17 |
| 10s | 15 | 22s | 17½ |
| 11s | 15 | 24s | 18 |
| 12s | 15½ | 26s | 18½ |
| 14s | 16 | 30s | 19 @19½ |
| 16s | 16¼ | 40s | 24@25 |
| 18s | 16½@17 | | |

## THE COTTON MARKET.

BY H. B. BEER, NEW ORLEANS.

*Specially Prepared for* COTTON.

As yet there are no signs for an early settlement of the Manchester cotton-mill operatives' strike, and we are now entering the last half of the fifth week since the mills closed down. Meanwhile the weather has been very favorable for the maturing of late cotton in the South, no killing frosts as yet to speak of, notwithstanding the near approach of November. The longer the English strike lasts, the more will consumption be curtailed. In England alone it has been cut about 50,000 bales per week owing to the lockout, and in Germany and in other sections of Continental Europe there is talk of short time continuing until the end of December, and there is still room for improvement in the United States.

On the other hand, every day of such weather as has been experienced for the last month is adding to the size of the crop, and of late there is more disposition to accept full crop ideas than views for a moderate yield.

The season's consumption may not be more than 12,000,000 bales, owing to bad trade the world over, and the year's production might be 13,000,000 bales, with the possibility of 13,500,000 bales. Nevertheless, there is but little change in price levels compared with one month ago, because of the trade believing in a moderate crop, and because of the opinion that the Manchester strike will soon be ended, and that business in America will improve after the presidential election.

It is not likely that business will improve to any extent until the new year. For sake of reference we give statistical comparisons brought down to and including October sixteenth:

| | This year. | Last year. | Year before last. |
|---|---|---|---|
| Amount of crop marketed. | 2,395,000 | 1,714,000 | 2.084,000 |
| Spinners' takings ..... | 1,249,000 | 1,057,000 | 1,107,000 |
| World's visible supply, | | | |
| American..... | 2,135,000 | 2,001,000 | 1,892,000 |

On September first of this year the world's visible supply of American cotton was 355,000 smaller than on the corresponding date of one year ago, and, as will be seen by the above table, the world's available of American cotton is now 134,000 larger than at this time last year, showing that there has been a relative increase in the world's visible supply of American cotton of 489,000 bales when compared with one year ago in the first forty-six days of the season, with every indication, owing to the heavy movement, of the increase becoming larger from week to week, making it possible for there being quite a surplus to be carried over at the end of next August.

This season's crop is quite a good one in quality and quantity. The condition of trade, however, is so unsatisfactory that the demand is principally for medium grades of uplands, all the big premium on high grades and staples having almost disappeared. It is only in times of much prosperity, as was the case up to about one year ago, that big premiums are paid for staples. So it follows that in years of depression, such as the present season, benders and long staples lose in value, relatively, irrespective of the course of the market. The trade, as yet, is unwilling to approve of large crop estimates, that is for a yield of 13,000,000 bales or more, as it is claimed that the reported short crops in Georgia, the Carolinas, Oklahoma and Louisiana will more than offset the increase in Texas, while Mississippi, Alabama, Tennessee and Arkansas, it is said, will hardly do better than last season. It is for this reason that prices have ruled comparatively steady the past month despite favorable weather and large receipts, not to mention the strike in Manchester and short time on the continent of Europe and in sections of the United States.

There will be issued on October 26th, a report by the Bureau of the Census which will give the number of bales ginned to the 18th instant compared with ginnings to a corresponding date one year ago and in previous years. It is expected that the amount of cotton ginned will approximate 5,500,000 bales, which will compare with 4,420,000 last year, 4,932,000 year before last, 4,991,000 in 1905 and 6,418,000 in 1904. The large ginnings expected this year are claimed to be due to an early maturing and an early gathered crop, not because of it being a very large one.

In this connection it might be admissible to state that there is every prospect of making as much cotton outside of Texas as was made last year, which was 9,351,000 bales,

perhaps more, and that Texas has furnished every indication of making 3,500,000 bales or more. These ideas are in close keeping with actual conditions and serve to belittle all reports to the effect that the crop will be a short one; not more than 12,000,000 bales as many are wont to contend.

## SOUTHERN COTTON MILL STOCKS.

Quotations by F. C. Abbott & Co.,
Charlotte, N. C.

| | Bid | Asked |
|---|---|---|
| Aiken Mfg. Co. | 75 | 85 |
| American Spinning | | 150 |
| Arkwright Mills | | ... |
| Arlington | | 166 |
| Avondale | | ... |
| Augusta, Ga. | 65 | 70 |
| Bonnie | 121 | ... |
| Bloomfield | | 118 |
| Brandon Cot. Mills | 120 | ... |
| Brookside | | ... |
| Capitol City, pref. | | 96 |
| Clara | | 126 |
| Clover | 150 | ... |
| Clinton | | 136 |
| Clinton, pref. | | 103 |
| Cliffside | 155 | |
| Chiquola Cot. Mills | 124 | ... |
| Cherokee Mfg. Co. | | ... |
| Converse | | 117 |
| Dallas Mfg. Co., Ala. | | 100 |
| Dilion | 60 | 68 |
| Efird, N. C. | 133 | ... |
| Elmira, pref. | | 96 |
| Eagle & Phoenix | | 128½ |
| Easley | | 150 |
| Edenton, N. C. | | ... |
| Exposition | | 240 |
| Fairfield | 75 | 80 |
| Florence, N. C. | | 136 |
| Gaffney Mfg. Co. | 66 | 70 |
| Gaston | | 100 |
| Gainesville | 49 | ... |
| Gibson | 95 | 99 |
| Graniteville, S. C. | 160 | |
| Gray Mfg Co. | | 126 |
| Grendel | | 119 |
| Greenwood | | 97 |
| Highland Park | | 170 |
| Hartsville, pref. | 100 | ... |
| Hartsville | | ... |
| Inman Mills S. C. | | 107 |
| Kesler | 140 | ... |
| Jno. P. King Mfg. Co. | 90 | 96 |
| Lanaster, com | 119 | ... |
| Lanett | | ... |
| Langley Mfg. Co. | 90 | 96 |
| Linden, N. C. | | 125 |
| Limestone | 145 | 161 |
| Loray, pref 1901 | | 98 |
| Lowell | 300 | ... |
| Mooresville, N. C. | | ... |
| Lumberton | | 198 |
| Mills Mfg. Co. | | 110 |
| Modena Mills | | 126 |
| Mollohon | | ... |
| Monarch, S. C. | 100 | 106 |
| Newberry | | 146 |
| Nakomis, N. C. | | 156 |
| Olympia, 1st | 65 | ... |
| Ozark | | 151 |
| Patterson | | 150 |
| Piedmont Mfg. Co. | | 176 |
| Pelzer | | ... |
| Pell City, com. | | 95 |
| Pell City, pref. | 100 | ... |
| Saxon | | ... |
| Sibley, Ga. | 60 | ... |
| Social Circle | | ... |
| Spartan Mills | | ... |
| Springstein | | ... |
| Statesville Cot. Mill | 115 | ... |
| Trenton, N. C. | | ... |
| Tryon, N. C. | | 143 |
| Tuscarora | 115 | ... |
| Tucapau, S. C. | 200 | ... |
| Toxaway | 94 | 95½ |
| Union Buffalo, 1st pref. | | 61 |
| Union Buffalo, 2d pref. | | 21 |
| Victor Mills, S. C. | | 128½ |
| Warren Mfg. Co., pref | 103 | ... |
| Washington Mills | 25 | ... |
| Washington Mills, pref. | | 118½ |
| Watts | | 101 |
| Wareshoals | | ... |
| Whitney | | 125 |
| Wiscassett | 180 | ... |
| Woodside | | 105 |
| Woodruff | | 126 |
| Williamston | | 108 |

## NEW ENGLAND MILL SHARES.

| | High | Low |
|---|---|---|
| Amoskeag Mfg. Co. | 247 | 235 |
| Arkwright Mills | 95 | ... |
| Androscoggin Mills | 155½ | 150 |
| Atlantic Cotton Mills | 60 | 60 |
| Barnard Mfg. Co. | 104 | 101 |
| Bourne Mills | 95 | ... |
| Chase Mills | .. | 120 |
| Everett Mills | 125¼ | 125 |
| Flint Mills | 100 | 99 |
| Granite Mills | 145 | ... |
| Lawrence Mfg. Co. | 137⅜ | 130 |
| Narragansett Mills | 122½ | ... |
| Massachusetts Cotton Mills | 101 | 90 |
| Merrimack Mfg. Co. | 40½ | 32 |
| Merrimack Mfg. Co., preferred | 82 | 75 |
| Pepperell Mfg. Co. | 285 | 275 |
| Seaconnet Mills | 70 | 67 |
| Tremont & Suffolk Mills | 98¼ | 85 |
| Wamsutta Mills | 125¼ | 120 |

Roanne, France, a town of about 40,000 inhabitants, some 60 miles from Saint Etienne, is the seat of the calico industry in this district. The number of mills in the town of Roanne and neighborhood amount to about 50, representing 400 looms per factory for the town proper, and 200 for the country, or 15,000 looms in all. The number of meters of calico turned out by one loom per day is 15, or a total of 225,000 meters per day.

Inquiries about anything pertaining to the textile industries will be cheerfully answered by COTTON.

# The Textile Mill Situation in New England and the South.

## NEW ENGLAND COTTON MILL INDUSTRY.

*Special Correspondence.*

A steady improvement is noticeable in the conditions of the textile industries in New England, in spite of the curtailments and short weeks. Curtailments in some of the large mills have continued, but there has been a general increase of working hours in those factories producing specialties, and the belief that the tide of depression and inactivity has turned is growing more extensive. Many of the large mills report increase of orders and larger orders. Some are obliged to work day and night, so the general condition of the textile industries is such as to inspire confidence, and those communities, which are dependent for commercial conditions on the activity of the mills, are more hopeful and encouraged.

### CONNECTICUT.

The property of the Ravine Mills Co., of Vernon, has been acquired by the First National Bank, of Hartford, for $14,500 in liquidation of a mortgage of $13,000 held by the bank. The assessed value of the concern is $38,000.

The Lawton Mills Co., of Plainfield, is building a new mill of brick, three stories high, 200 by 180 feet area at a cost of $260,000. The equipment will be of the most modern machinery for cotton manufacture. About 300 persons will be needed to carry on the plant, which it is hoped will be open in the spring of 1909.

The Russell Manufacturing Co., Middleton, is building a brick mill, 110 by 50 feet area, to accommodate 100 looms for the production of cotton webbing. The present plant is unable even with crowding to keep up to its orders.

### MASSACHUSETTS.

Scarcity of water has affected the cotton mills at Chicopee, with the Chicopee Manufacturing Co. and the Dwight Manufacturing Co., being obliged to resort to the auxiliary steam power in order to run their factories. Both of these mills resumed full capacity time early in October, having been previously on four days a week, and six months ago they were running only three days a week.

Conditions governing the Arnold Paint Works, of North Adams, have been much improved during the past few weeks. A satisfactory arrangement has been made with the creditors, and reorganization is in the air, and a prospect of a good winter's work.

Extensive curtailment has been necessary among the large mills of Fall River; the yarn mills being especially affected. The print-cloth mills were obliged to close for a number of days. The Merchants' Manufacturing Co. has changed the carding department of the No. 3 mill, formerly

known as the Crescent Mill, and can now produce medium counts goods. This mill heretofore has been making goods of print cloth construction. One of the largest steel pulleys in Fall River has been installed in the weave room of the Shove Mills, No. 1. The pulley is a split steel, four-ring wheel of special construction; the face is 38 inches, the diameter 78 inches, and the bore is 6 7-16 inches. The weight is about 1,000 pounds.

RHODE ISLAND.

The Tamarack Company has been incorporated at Providence with a capital of $100,000. William P. Wood, John E. Lent and John Henshaw are the incorporators. The product will be textile fabrics of various kinds.

Howard F. Burdick and others, of Woonsocket, are opening there a factory for the manufacture of cotton and canvas gloves.

## NEW ENGLAND MILL SITUATION.

*Special to* COTTON.

There has been a further improvement in the re-establishment of confidence in the cotton goods situation during this month and prices have maintained a firm undertone with fractional advances in isolated cases. There is a general feeling that after election this improvement will become more pronounced and goods will move freely at hardening prices, for immediate as well as future wants. Manufacturers are unwilling to accept contracts over the turn of the year at prevailing prices, on the other hand buyers are not sufficiently sure of their premises to anticipate their future requirements at advancing prices.

Manufacturers throughout New England feel quite cheerful over the situation, although they appear unwilling to back their confidence in the immediate restoration of demand and prices to the extent of buying raw cotton for future deliveries except to cover actual contracts with 15 per cent. margin. That is, many mills are limiting their orders for raw cotton to 15 per cent. greater than actual contracts call for. This is considered a grave error of judgment among a certain class of older cotton manufacturers who have been caught short of cotton in times past, because they looked for "lower prices."

The cause of this improvement in the demand for cotton fabrics is the greater activity of converters in the primary markets, with the result that prints are in good request with prices firm. Wide 64's are selling at 4½ cents, and during the middle of October a very large contract was refused at this price because deliveries were called for in December and January. The buying by printers is the feature of the Fall River market. China buyers are bidding for light weight sheetings but their quotations do not bring out many goods. There still continues a big stock of goods at Shanghai and until this is moved we can not expect much from the Chinese. Boston sellers are holding 3.50 sheetings at 5 cents, and exporters are bidding a firm 4⅞ for large quantities for the Red Sea market. Other goods of print cloth construction are being held firm for the South American market which at the moment is holding off from buying until after our election.

This action of the Amoskeag Mfg. Co. in placing a restriction of price on the sale of their ginghams has done much to brace up this market. Prices are being held firm for all Northern ginghams with a good market for spot goods and for deliveries up to the first of the year. Southern ginghams are confined to a narrow market for the leading ticketed goods; but with the distributors' shelves depleted of stock there must come a revival of interest in all lines of Southern ginghams and since many thousand looms have been changed from ginghams to other fabrics, during the past six months, there will be a shortage of spot goods after the first attack of genuine buying.

The labor market is very satisfactory in New England with every indication of an abundance of efficient help at prevailing wages for some months to come. The efficiency of cotton operatives has vastly improved since the last general reduction in wages, which occurred during the summer months, and will be reflected in earnings just as soon as manufacturing becomes profitable to the rank and file of cotton mills in New England.

Manufacturers of textile machinery report a very much greater volume of business this month than any previous month since April, which was the banner month of the year. Orders are being received from mills all over the country that have either been idle or curtailing production for some months, but are now starting up on full time. Loom repair parts are in strong demand, because while curtailment was in force the idle looms were robbed to keep the operating looms in good repair. Draper Co., and The Stafford Co. have accepted several large orders for looms recently, while the Whitin Machine Works report a marked improvement in their orders. Crompton & Knowles Loom Works are doing a larger business than during September and are confident of an immediate bracing up of the general industrial situation, according to a statement of one of their representatives.

There has been little doing during the month in cotton mill stocks although prices have held firm and interest in the better issues well maintained. Pepperell, which sold off to 276, the lowest point of the year, returned to 280½ and held firm during the balance of the month. There is no probability of an extra dividend this year or the first of next year on Pepperell because it is understood that they have a large stock of goods on hand which they are holding for higher prices, and until these are closed out there will be no extra dividends. This stock has averaged 26 1/3 per cent. per annum for the past eight years.

The advance in Nashua stock is now believed to have been due to buying for control and as this has been accomplished this month there will probably be no further change in the price of this stock. There have been several private sales of Arlington at 135 this month and there are bids in for about 160 shares at 130 to 132½, but no stock is offered at lower than 135, which is considered low for a stock that has paid 8 per cent. for many years.

Amoskeag holds firm at 245, and why shouldn't it when the annual report just issued shows that this mill made more money this past twelve months on a smaller gross business than the previous year. This stock is one of the gilt-edge securities of New England and is an excellent investment at prevailing quotations.

The Fall River cotton mill share market has been very quiet this month with prices holding firm. There is no disposition to sell and buyers are unable to secure blocks without bidding prices up which is against general principles during a period of industrial depression. Nearly all of the regular dividend paying mills have declared their usual quarterly dividend payable during October and the first half of November. New Bedford stocks are firmer with few offerings.

## SOUTHERN TEXTILE MILL NOTES.

*Special to* COTTON.

Perhaps the best indication that conditions affecting Southern cotton mills are steadily, if slowly, improving, is the fact that most of the mills heretofore closed totally or partially are now running. In the last month's notes there was published a list of mills that had just resumed operations, after suspensions running back for several months. During the month of October a large number of other mills resumed work. In some cases, the mills had been closed for the better part of the year; in other cases, partial operations had been followed through the summer months, the mills running only a few days each week. The fact that conditions now are such as to warrant these mills taking up their old time again is taken to signify a considerable improvement in conditions in the textile trade. The yarn situation is growing better. Demand for goods is stronger and there is some improvement in market quotations.

Here are a few of the mills that went back to work during October: The Alpine Cotton Mill No. 2, Morganton, N. C., resumed operations two weeks ago. The Continental Manufacturing Co., Charlotte, resumed operations a few days ago after a suspension of operations extending back to December. This mill has 12,672 spindles. During this long period of idleness many improvements have been made in the plant. The Dallas Cotton Mills and the Monarch Cotton Mills, Dallas, N. C., have resumed operations after being idle for some time.

A night crew has been put on by the Park Woolen Mills Co., of Rossville, Ga. The Barbour Cotton Mills, Eufaula, Ala., after being idle for four months, have started up work again. It is reported the Ellawhite Cotton Mills, of Uniontown, Ala., are planning to resume operations. The Vivian Cotton Mills, Cherryville, N. C., after being idle for most of the months, have gone back to work. It is said they have orders enough to keep running full time to the first of the year.

After running four days a week for most of the summer, the National and Lumberton Cotton Mills, Lumberton, N. C., have gone back to full time, and expect to keep running. The Randleman Hosiery Mills, Randleman, N. C., have resumed operations. After a shut-down of three months the Aragon Mills, Aragon, Ga., are now running full time. The mills have been thoroughly overhauled during the period of idleness. It is reported here the Fitzgerald Cotton Mills, of Fitzgerald, Ga., are about ready to go back to work. These mills employ 220 hands and operate 10,000 spindles.

These are a few of the mills that have found conditions such as to warrant a taking up of work during the month past. One of the posted mill men in North Carolina states that he believes 80 to 90 per cent. of the Southern mills are now running, and that in his opinion operations will be continued without interruption. The election over with, it is freely predicted on all sides here that an early revival of business may be looked for. The curtailment carried on by most of the mills of the South for the past eight to ten months is bound to cause a return of healthy demand for goods and the restoration of profitable prices.

Another indication of the general improvement now being experienced is the revival of building operations among mills. A large number of Southern mills are enlarging their plants just now, preparatory to the increased business they confidently expect at an early date. New machinery is being installed and general improvements in equipment made. Besides this fact, not a few new mills have been organized recently. All of which goes to signify an abiding confidence in the future of the industry in the South. Here are a few mills that have recently planned additions:

An additional building, to accommodate 2,500 spinning spindles, is reported to be under contemplation by the Shelby Cotton Mills, Shelby, N. C.

At the stockholders' meeting of the Cora Cotton Mills, King's Mountain, N. C., recently held, it was found that the mills have had a good business this year. Old officers were re-elected.

The Modena Cotton Mills, Gastonia, N. C., are now operating full time after running half time for several months. The products of the mills are brown sheetings and yarn for lace curtain manufacture, and the decision to go back to full time was necessary because of the increase in business. The mill operates 17,860 spindles and 216 broad looms. It employs 250 persons.

Judge Boyd has ordered the sale of the Odell Manufacturing Company's property at Concord, N. C., on November 25. This action was upon petition of Caesar Cone, Greensboro, N. C., receiver for the company, and agreeable to a resolution adopted at a meeting of creditors. Judge Boyd orders the following allowances to be paid as administrative expenses, stating he would make a further allowance for the receiver: Creditors' committee, $3,000; counsel fees, $10,000; Caeser Cone, receiver, $20,000.

A very important meeting of mill overseers, superintendents and engineers was held in Charlotte October 23d and 24th, at which time a Southern association was formed. The meeting was called by the Spray Textile Overseers' Association, of Spray, N. C., and was largely attended by overseers and superintendents from all over the South. The object of the organization is the better education and development of Southern overseers and engineers, and the association is strictly non-union in nature. It is supported by mill presidents and officials. A number of papers were read at the meeting on timely subjects. Albert Wilmow, of the Southern Power Company, Charlotte, read an interesting paper on "The Electric Drive in the Mill." John W. Fox, of the Westinghouse Electric Co., read a paper on "The Evolution of the Spinning Frame." Prof. Thomas Nelson, of the Raleigh, N. C. A. & M. Textile School, read a paper on "Fancy Weaving and Designing." David Clarke, Charlotte, read a paper on "The Relation of the Overseer to the Mill."

Great interest is being taken in Southern mill circles over the question of electric driving of textile machinery, and a number of experiments are now being made in a number of Southern mills to demonstrate the cost and efficiency of the different systems. When the electric drive was first brought out it was customary to use a very few large motors, but the latest development is the use of a motor to each machine and recent experiments made in Charlotte and other points seem to demonstrate that this system will come into general use. The chief claim for this system is that it does away with all belting and shafting, and that thereby steadier speed is obtained, and the power of consumption can be more accurately judged.

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# NEW MACHINERY AND TRADE NOTES

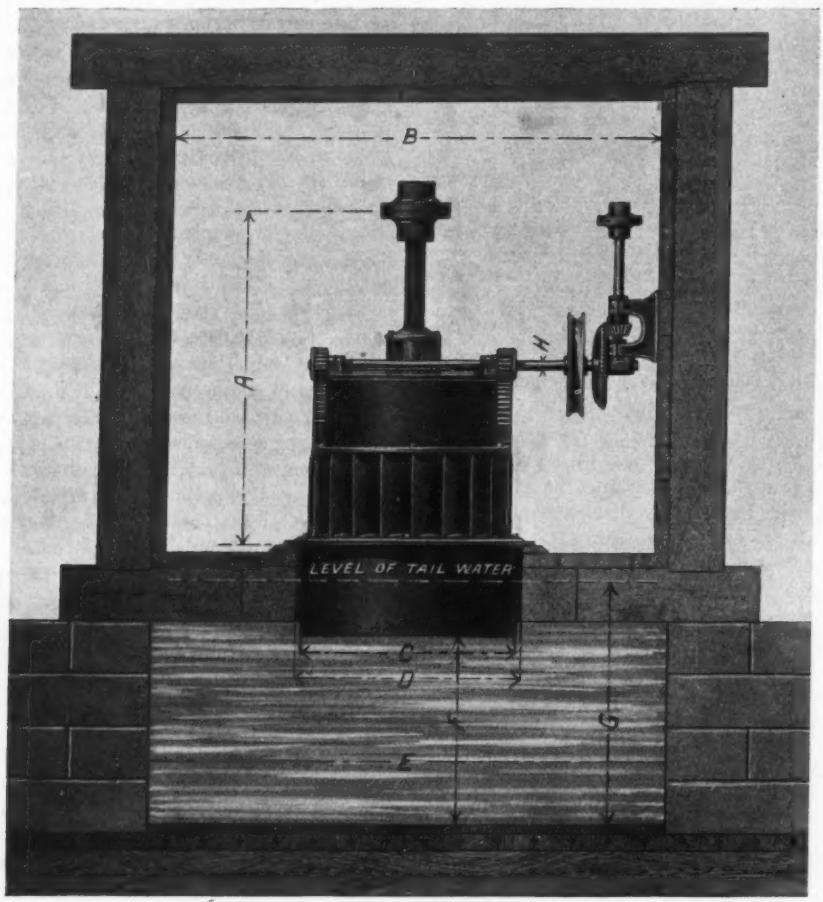
## TURBINES.

We illustrate herewith two turbines, one upright and the other horizontal, manufactured by J. & W. Jolly, Holyoke, Mass. The bulk of this company's business is the manufacture of water wheels, but it also supplies factories with shafting, hangers, gearing and other appliances for power transmission.

This company took up the manufacture of turbine wheels in 1888, with John B. McCormick. During the period from 1888 to 1894 Mr. McCormick made for this company a complete set of master patterns, ranging from 9 to 66 inches in diameter, the only set in existence, being from 10 to 25 per cent. greater in power, as to diameter, than his previous effort, and standing to-day unsurpassed for efficiency, as no wheel is put on the market until it has exceeded 80 per cent. efficiency in the testing flume of the company.

To meet the demand for direct connection to electric generators, this company has designed a number of special wheels of high speed and power, and it is in a particularly favorable position to design wheels to meet special requirements for greatest economy. The usual method of setting turbines has been to place the wheels so as to revolve in a horizontal plane, the shafts being vertical. With the advent, however, of expansion in the electric fields and the application of water power to the generating of electrical currents, it became necessary to set turbine wheels in a vertical position on horizontal shafts. This practice, while ideal in construction, has not always been satisfactory from a power point of view; in fact, some very large installations of this kind have fallen from 10 to 25 per cent. short of their proposed power.

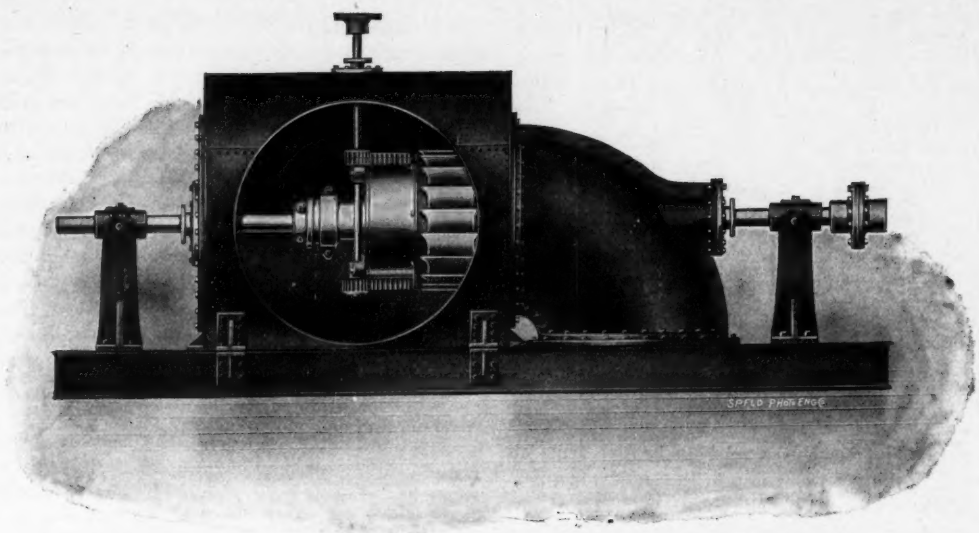
There are some essential principles in draft-tube construction that are overlooked in ordinary turbine building. Past experience has clearly demonstrated that vertical step




VERTICAL TURBINE IN FLUME.

turbine tests will not hold in horizontal settings, unless correct construction is used in the whole system. It might be added that it is possible, through faulty construction, to develop no power from water that has passed the turbine, while, on the other hand, the water may be made to yield power even after it has reached the lower level or tail water.

In further reference to Mr. McCormick, it may be said that his name is familiar wherever first-class turbines are known. His early life as a raftsman on the Allegheny River, his preliminary work of developing several systems



MCCORMICK CYLINDER GATE TURBINE, HORIZONTAL TYPE, IN STEEL FLUME.

of turbines for various manufacturers, and his final development of a full series of tested patterns in the shops of J. & W. Jolly, are matters of history. The fact that he made as high as 18 sets of patterns for some of his turbines before being able to secure the desired results is not generally known; neither is it known that it took years to develop a full series of patterns, nor that these patterns have remained in the shops of the original owners, in Holyoke, Mass.

McCormick learned that a log could be drawn more readily through water butt first, requiring less power than if drawn top first. He learned that a stream or jet of water had its highest velocity in its center when not acted upon by other forces, and he was the first to recognize this in constructing and patenting a turbine bucket. He learned that whirls, eddies and cross currents recklessly ignore any formulae that are usually developed for their guidance; he also learned that a pattern perfected in shape for one size of runner could in no way guide him to a pattern for a larger or smaller size. So he patiently developed his patterns one set at a time, until they would produce a turbine satisfactory to him. His work was then only half finished, as it was necessary to make a second set of patterns for turbines to turn in the opposite direction. These full series of patterns, with the data pertaining to their exact positions in the turbine structure, constitute the stock in trade so far as patterns go.

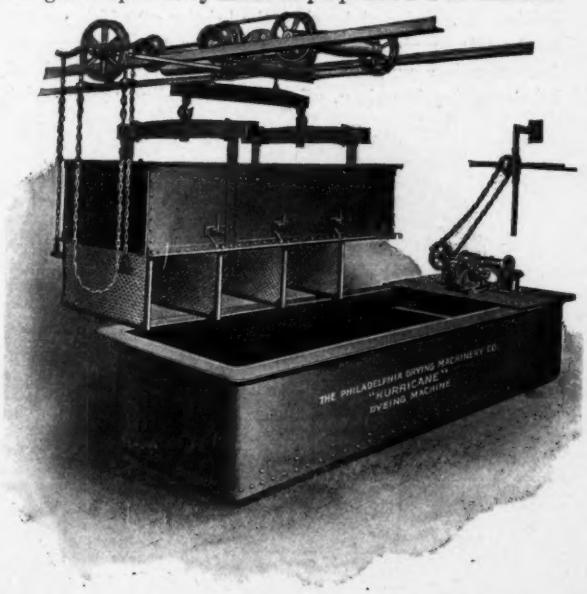
## LATEST IMPROVEMENTS IN DYEING MACHINERY.

The manufacturing industries are now facing a condition of affairs that necessitates the use of machinery that is modern in every respect. Crude, antiquated apparatus has been consigned to the scrap heap and wise counsel has prevailed to such an extent that many mills are now actually in a better position than ever to turn out their goods at an increased profit, having installed thoroughly up-to-date machinery.

In reducing to the lowest possible point the expenses connected with dyeing, the "Hurricane" Circulating Dyeing Machine stands in a class by itself. It is seldom that any machine can show such a record of efficiency, as the item of labor has been reduced seventy-five per cent., and but a fractional part of the dyestuffs and steam are required to produce good results on a given quantity of material.

It should be borne in mind that this type of machine is peculiarly adapted to handling any character of dyeing, but as the sulphur process is of special interest to the trade at this particular time, we will give a brief description of that system as applied to raw stock, hosiery, etc.

The iron basket or cage, which is provided with heavy wire screen doors both top and bottom for convenience in loading and unloading, is lowered into the first machine, the tub and fittings of which, are entirely of iron. The best results are secured by the sulphur process when the material is kept under the liquor during the entire dyeing operation, thus preventing any possibility of oxidizing. Uniform distribution of the dye liquor assures perfect dyeing, this being accomplished by means of propellers and an automatic




"HURRICANE" CIRCULATING DYEING MACHINE FOR RAW STOCK, HOSIERY, ETC.

reversing motion, thereby causing the dye liquor to flow alternately upward and downward. As soon as the dyeing is completed, the basket and its contents are raised, transferred bodily along the overhead trolley and lowered at once into the second machine, where the washing is done. In the latter case, the tub is made of wood, but the positive circulation of the water in opposite directions is accomplished in the same manner as in the first machine. It is remarkable how quickly and with what ease the basket is raised or lowered with the aid of the improved pneumatic hoisting apparatus and the practical dyer can not help contrasting this system with the old, laborious methods of dyeing.

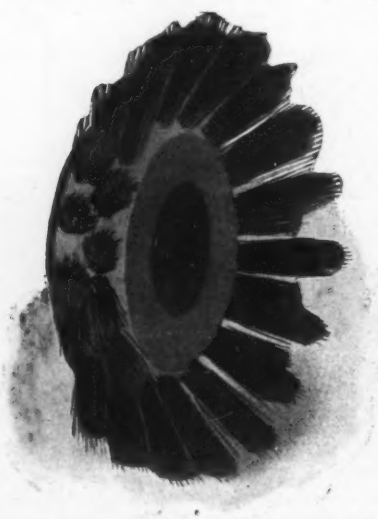
Skein yarn is handled most advantageously by this same system, but it is necessary in that case to have a special frame to accommodate the dye sticks from which the skeins are suspended. These machines are built by The Philadelphia Dyeing Machinery Company, 6721 Germantown avenue, Philadelphia, Pa., the well known builders of the "Hurricane" dyeing, drying and finishing machinery and presses, and to whom we would refer for any further information.

## BRISTLE CLOTH STRETCHER.

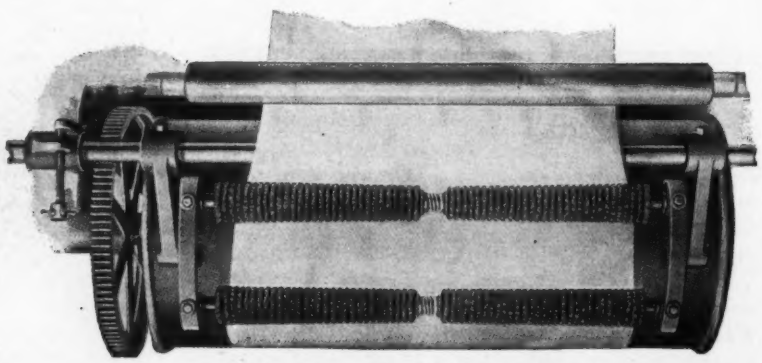
The new bristle cloth stretcher which we illustrate herewith is built by the American Finishing Machinery Co., No. 45 Milk Street, Boston, Mass., the principal feature of which is to stretch any and all classes of textile fabrics in a satisfactory manner without disturbing the finish, damaging the warp, bending the weft, or distressing the fabric in any way. Dirt, grease or oil and other objectionable features, as complications in adjusting and threading up, are eliminated.

As will be seen in the illustration, there is a marked difference existing betwen this device and others that are used for the same purpose, as the fabric passes beneath the bars and not under one and over another. The expander consists of a series of brushes, the bristles of which project to the left or right from the center as the case may be. Its action is a pushing or deflecting one, the multitude of bristles acting in unison, effectively expanding the material. One advantage of the device lies in the fact that it can be made with either one, two, three or five complete brushes, and can be applied to various parts of the machine.

This machine has been in use in American mills for a number of years, the following being some of the plants where it is in operation: United States Finishing Co., Apponaug, R. I.; Aspinook Co., Jewett City, Conn.; Cheney Bros., South Manchester, Conn.; Danvers Bleachery & Dye Works, Peabody, Mass.; Farwell Bleachery, Lawrence, Mass.; Glenwood Works, Medford, Mass.; Lowell (Mass.) Textile Co.; Massachusetts Cotton Mill, Lowell, Mass.; Merrimack Manufacturing Co., Lowell, Mass.; The Jewett City (Conn.) Textile Novelty Co.; The Pond Lily Co., New Haven, Conn.



Bristle Brush.



Double Bristle Cloth Stretcher.

## "SUPERIOR" BELT DRESSING.

The Superior Chemical Manufacturing Company, Grand Rapids, Mich., makers of "Superior" belt dressing, announces that it is giving away five-ounce samples of its product and users are invited to write for same.

John Breichting, Secretary and Manager.

John Breichting, the secretary and manager of the company, developed this dressing as the result of many years' experience as superintendent in some of the largest factories, and after trying many various kinds which were not to his liking, he developed this dressing and it proved to be a winner in the short time of five years, and while the company can turn out a ton a day, it is planning to double the size of its plant to take care of the increasing business. Among one of the latest contracts secured is that from the American Car & Foundry Co., for its 18 large car works requiring about 20,000 pounds.

The accompanying picture of Mr. Brechting is used as a trade-mark.

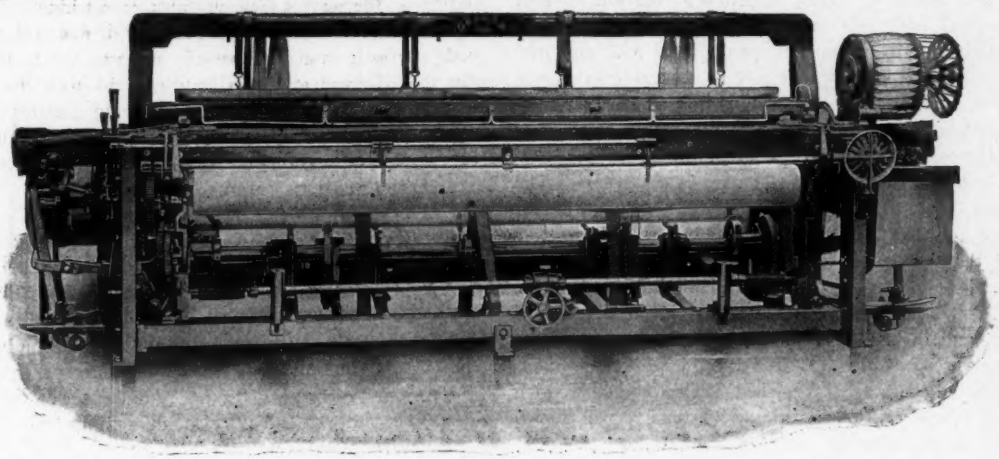
The Jeffrey Manufacturing Co., Columbus, Ohio. This company is distributing to the trade an illustrated booklet showing its conveying machinery for sawmills, lumber mills and manufacturing plants of all kinds. Those interested in machinery of this kind would do well to write the company for its booklet.

## THE DRAPER L-MODEL LOOM.

We call attention to the Draper Company's L-Model broad sheeting loom, shown herewith. The loom was specially designed for this class of work. The parts are built with plenty of stock to avoid breakage; the drive is by friction pulley with auxiliary gearing. A high roll take-up is used; also a compound let-off with double beams and a twine harness mechanical warp stop-motion. There is an attachment reaching across front of breast beam so that the loom can be started or stopped without the weaver walking back to the shipper handle.

The company has now in operation in the mills 1,850 looms of this model and has recently booked orders from several of these same mills calling for over 500 more.

A report from one of the company's traveling men shows as high as twenty of these looms being operated per weaver, the weaver filling his own batteries.



THE DRAPER L MODEL BROAD SHEETING LOOM.

## RETURNING TO THE HAND LOOM.

A new hand loom has been built by Crompton & Knowles Loom Works, Worcester, Mass., and put on the market as a direct result, it is stated, of the activity displayed in the arts and crafts department of the Worcester art museum. This is said to be the first time in history that a really first-class practical hand loom has been constructed. The company has made ten of the new looms to start with, and it is believed that as a result of the introduction of this loom there will be a renaissance of the hand-weaving industry that will make this generation notable in that direction. Of the ten machines, four are going into the Salisbury mansion, Worcester, for the use of the weaving classes, and two are going to Marblehead, Mass.

## ENGINE DRIVEN EXTRACTOR.

The accompanying illustration is that of an engine driven extractor manufactured by the Tolhurst Machine Works, Troy, N. Y. This is only one of the many styles of extractors put out by this progressive concern.

The extractors are made in such a variety of sizes and the baskets of so many different kinds of material that the buyer can find a machine suitable for most any or all requirements.

The concern's experience in designing extractors for special purposes has been long and varied. The Tolhurst extractor is conceded by users all over the country to be unexcelled by any other in the market. The cost of upkeep is a mere trifle, and, in some cases, machines that have been in use for over fifteen years have never had any repairs made on them. There are no weights, springs or rubber cushions to give trouble, the self-balancing feature being purely mechanical.

THE TOLHURST EXTRACTOR.

Some three or four years ago when the ribbon industry in France was in a flourishing condition the weavers earned a respectable living, which might be calculated at $1 or more per loom per day, on the ordinary cheap ribbon, while those who worked on high-grade fancy or velvet ribbons earned about double that amount. At present all this is changed.

The Wildman Manufacturing Company, Norristown, Pa. This company has issued a new 80-page catalogue relating to its manufactures, which it is anxious to have in the hands of all knit goods manufacturers. The catalogue is illustrated with full-page half tones and a complete description of the company's sleevers, underwear and sweater machines, hosiery ribbers, automatic stop motions and electric cloth cutters, besides a number of pages devoted to valuable information for knit goods manufacturers—such as yarn tables, etc.

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Maryland Bleach & Dye Works, Baltimore, Maryland. Cotton yarn dealers and mills selling bleached and dyed hosiery and weaving yarns, and manufacturers buying their yarns in the gray and having their bleaching, dyeing, mercerising and tubing or coning done elsewhere, will do well to correspond with this company. This concern is well prepared to fill all orders with promptness and care, the finished yarn can be shipped direct to the trade in export bales or on tubes or cones as desired. All work is done by experienced help under the management of Eugene Fischer, an experienced dyer, bleacher and mill man. Special attention is given to matching samples in all colors. The company's fast and permanent dyes are much in demand at present and have gained a wide reputation. The greater part of the dyeing is for government orders on cotton goods, and fast dyes are used for heavy fulling and for bathing suits. All work is carefully inspected before shipping, and if brilliancy of color, consistent with durability is desired, samples of their work with lowest quotations will be cheerfully furnished. This company is a branch of Fischer & Co., Reutlingen, Germany, well known dyers and mercerisers.

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Grinnell Willis & Co., New York, have been appointed selling agents for the entire production of the 440 print-cloth looms of the Fountain Inn Mfg. Co., Greenville, S. C. This is the entire product of this mill aside from their production of damasks.

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The Arabol Manufacturing Company, New York. Finishing compounds of tried excellence for bleaching, dyeing and print works, are made in great variety by this company, who make a specialty of these as well as of alizarine assistants, etc., for the use of textile manufacturers. Tangol, that wonderful new German invention, has lately been added to its list. Besides starches of all kinds of its own manufacture, this company handles China clay, talcum, dextrines, chloride of magnesium, and imported potato starch.

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John Florence, East Point, Ga., representing Alexander & Garsed, Charlotte, N. C., woolen machinery agents, recently favored us with a visit, in relation to a system for remanufacturing jute bagging for baling cotton. We believe the system that Mr. Florence is introducing to manufacturers of jute bagging possesses many points of merit worthy of careful consideration.

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Shultz Belting Co. At the last meeting of the Missouri Manufacturers' Association, J. A. J. Shultz, president of the Shultz Belting Company, and manufacturer of the well-known Shultz "sable rawhide" belting, and Shultz "aqua" water-proof belting, and other leading lines, was elected president of the association. This is a Missouri State Association with headquarters in St. Louis.

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Boiler Troubles and Their Prevention is the title of a 48-page treatise just issued by the Bird-Archer Co., 90 West St., New York. This book will interest all who own or operate steam boilers, for it explains corrosion, scale, oil and grease deposits and what harm they may do. It tells what scale consists of, how it collects, resulting loss in fuel and steaming capacity, dangers from overheating, cost of mechanical cleaning and the advantage of boiler compounds in preventing scale, oil deposits or corrosion.

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Frank Stiner, Lawrence, Mass., makes what is known as "Stiner's twentieth century machine." It is the only machine in the market that will dampen all kinds of goods, whether woolen, worsted, or cotton. It will dampen the goods perfectly even from side to side and end to end, and with the pressure guage being connected with the spraying device every piece of goods requiring dampening may receive the same amount of moisture. This is an important feature when it is desired to run a large lot through and have them receive a uniform finish.

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Muralt & Company, New York, have secured the contract for the enlargement and improvement of the hydro-electric plant of the Riverhead Electric Co., of Riverhead, L. I. The old water wheels now in use will be taken out and new turbines of the vertical shaft type will be installed. The electric equipment will be of the three-phase alternating current type with a frequency of 60 cycles per second and 1,100 volts. There is also an auxiliary steam plant for emergency purposes.

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The Merrow Machine Company, Hartford, Conn. This company sends to the trade upon application a very handsomely illustrated catalogue of its manufactures of high speed overedge, overseaming and shell stitch machines, all parts of which are interchangeable, the working parts being made of fine steel hardened and ground to fit. Among the machines made by this company are included the following types: Two thread plain crochet machines; single thread blanket hemming machines; two thread shell stitch machines; two thread overedge finishing machines; three thread overedge finishing machines; two thread trimming and overseaming machines; and three thread trimming and overseaming machines. The company makes several or many varieties of each of the foregoing types of machines, as well as many modifications thereof.

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Capital City Machine Works, Columbus, Ohio. This company manufactures what is known as the 1896 model Standish foot-power riveting machine, used for patching and splicing cotton bale bands. This machine is in a measure indispensable to every cotton compress and others using cotton ties. It is simple in its operations. Its weight is 565 pounds. The large dies are forged steel and are tempered.

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Pike Adding Machine Company, Orange, N. J. This company has just put upon the market a machine designed exclusively for the cotton trade and which they have christened "King Cotton Special-Pike." The company claims that by accurately and quickly performing its duties the